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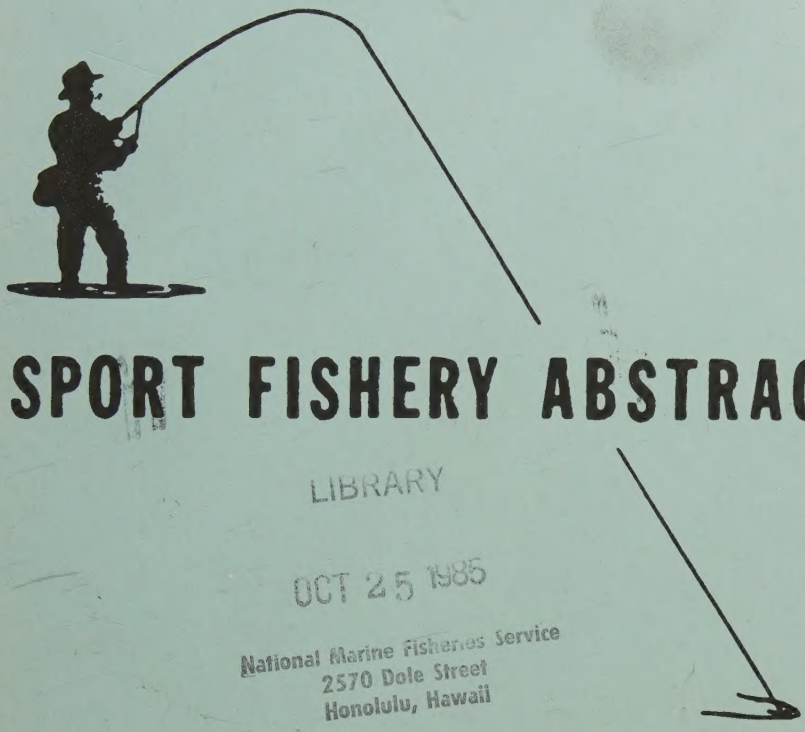

SPORT FISHERY ABSTRACTS

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SPORT FISHERY ABSTRACTS

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Editorial Section
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Fort Collins, Colorado 80523

Sport Fishery Abstracts is intended to furnish fishery biologists with abstracts of current literature in sport fishery research and management.

One volume, consisting of four numbers, is issued each year. Each number contains separate Author, Geographic, and Taxonomic indexes, and the final number of each volume contains cumulative Author, Geographic, Taxonomic, and Subject indexes, and a list of publications screened. Authors who publish in journals not screened for *Sport Fishery Abstracts*, and who would like their publications included, should submit abstracts to the Editor.

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SPORT FISHERY ABSTRACTS

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AQUATIC PLANTS AND THEIR CONTROL

85-002019 Hinman, M. L. QUALITATIVE AND MICROCOSM PREDICTIONS OF EFFECTS OF ENDOTHALL FOR CONTROL OF *MYRIOPHYLLUM SPICATUM* IN PAT MAYSE LAKE. *M.S. thesis, North Tex. State Univ.* 318p. 1984. From Masters Abstr. 23(1):113. 1985. SFA 30(3)

85-002020 Richard, D. I.; J. W. Small, Jr. and J. A. Osborne. RESPONSE OF ZOOPLANKTON TO THE REDUCTION AND ELIMINATION OF SUBMERGED VEGETATION BY GRASS CARP AND HERBICIDE IN FOUR FLORIDA LAKES. *Hydrobiologia* 123(2):97-108. 1985. SFA 30(3)
[Dep. Biol., Rollins Coll., Winter Park, FL 32789]

GENERAL FISH CULTURE

85-002021 Boyd, C. E. POND EVAPORATION. *Trans. Am. Fish. Soc.* 114(2):299-303. 1985. SFA 30(3)
[Dep. Fish. Allied Aquacult., Ala. Agric. Exp. Stn., Auburn Univ., AL 36849]

85-002022 Cuenco, M. L.; R. R. Stickney and W. E. Grant. FISH BIOENERGETICS AND GROWTH IN AQUACULTURE PONDS: III. EFFECTS OF INTRASPECIFIC COMPETITION, STOCKING RATE, STOCKING SIZE AND FEEDING RATE ON FISH PRODUCTIVITY. *Ecol. Model.* 28(1-2):73-95. 1985. SFA 30(3)
[Computer Technol. Unit, Tex. Agric. Ext. Serv., College Station 77843] A simple pond environment model linking stocking rate, feeding rate and initial size distribution to environmental factors was developed. A population growth model was also developed from the individual fish model in a previous paper by including social interactions. The pond environment model was linked with the population growth model to develop a pond culture model which was parameterized with channel catfish data. The pond culture model predicted a growing season of 230 days from 10 April through 27 November for channel catfish raised in College Station, TX, U.S.A. Feeding fish as a function of appetite was superior to feeding them a fixed percentage of body weight. Under the regime of food competition among catfish, fish weights were more variable, yield was less, and the culture period to market size was longer compared with the regime of no food competition. Increasingly higher yields were produced by successively optimizing growth factors as they became limiting at certain levels of production. A factorial experiment involving stocking rate, initial size, and feeding rate was simulated using the pond culture model. The relationhsip of market yield to stocking rate, for any given feeding rate or initial size, was described by a downward opening parabola. Hence, an optimum stocking rate exists, where yield is maximum.

85-002023 Cuenco, M. L.; R. R. Stickney and W. E. Grant. FISH BIOENERGETICS AND GROWTH IN AQUACULTURE PONDS: I. INDIVIDUAL FISH MODEL DEVELOPMENT. *Ecol. Model.* 27(3-4):169-190. 1985. SFA 30(3)
[Computer Technol. Unit, Tex. Agric. Ext. Serv., College Station 77843] A dynamic model of fish bioenergetics and growth at the organismal level under controlled environments was developed as a tool to study, evaluate, and improve the management of fishpond grow-out systems. The model incorporated five key variables, namely body size, temperature, dissolved oxygen, unionized ammonia and amount of food, and 17 growth parameters which defined the species of fish used. Parameters were estimated for channel catfish. Fish growth was more sensitive to changes in food consumption parameters than to changes in metabolic parameters. Within either the food consumption component or the metabolic component, fish growth was more sensitive to changes in temperature parameters than to changes in parameters for body size, dissolved oxygen or unionized ammonia. The model may be reparameterized

GENERAL FISH CULTURE (CONTINUED)

85-002023 CONTINUED to represent different species of fish in different environments and provide a common ground for theoretical, laboratory and field studies. It also provides a means by which research activities of several groups can be coordinated toward achievement of a common goal.

85-002024 Cuenco, M. L.; R. R. Stickney and W. E. Grant. FISH BIOENERGETICS AND GROWTH IN AQUACULTURE PONDS: II. EFFECTS OF INTERACTIONS AMONG SIZE, TEMPERATURE, DISSOLVED OXYGEN, UNIONIZED AMMONIA AND FOOD ON GROWTH OF INDIVIDUAL FISH. *Ecol. Model.* 27(3-4):191-206. 1985. SFA 30(3)
[Computer Technol. Unit, Tex. Agric. Ext. Serv., College Station 77843] In a previous paper, predictions of the individual effects of size, temperature, dissolved oxygen, unionized ammonia and food on fish growth from an organismal model of fish bioenergetics and growth agreed well with available data. Model predictions of the combined effects of size and temperature, size and food, temperature and food, and dissolved oxygen and food on growth also agreed well with available data. Model predictions of six undocumented two-factor interactions were consistent with other known interactions and general principles of fish energetics. The model was also used to predict maximum, optimum, and maintenance rations under controlled environments.

85-002025 Jana, B. B. and G. N. Patel. DISTRIBUTION PATTERN OF DENITRIFYING BACTERIA IN FISH PONDS OF DIFFERING FARMING MANAGEMENTS. *Arch. Hydrobiol.* 103(3):291-303. 1985. SFA 30(3)
[Dep. Zool., Univ. Kalyani, Kalyani-741235, India]

85-002026 Zweig, R. D. FRESHWATER AQUACULTURE IN CHINA: ECOSYSTEM MANAGEMENT FOR SURVIVAL. *Ambio* 14(2):66-74. 1985. SFA 30(3)
[New Alchemy Inst., 237 Hatchville Rd., East Falmouth, MA 02536]

TROUT AND SALMON CULTURE

85-002027 Ísaksson, Á. THE PRODUCTION OF ONE-YEAR SMOLTS AND PROSPECTS OF PRODUCING ZERO-SMOLTS OF ATLANTIC SALMON IN ICELAND USING GEOTHERMAL RESOURCES. *Aquaculture* 45(1-4):305-319. 1985. SFA 30(3)
[Inst. Freshwater Fish., Reykjavik, Iceland] The paper describes the rearing and growth rates of zero-age, one-year smolts and 400-gram smolts in Iceland using geothermal resources. The hatching and rearing regimes for accelerated smolts are compared with those for non-accelerated fish. Return rates of one-year smolts are related to photoperiod and temperature regime used. Two methods of producing adults are discussed, i.e. by rearing smolts in 400 grams with subsequent rearing in sea-pens, and accelerated rearing of adults in tanks to market size. These methods are compared with conventional pen-rearing in Norway with respect to growth rates and sexual maturation. The thermal power required for the production of various sizes of salmon is also presented. The experiments have shown that accelerated production of zero-age smolts for ranching is not practical as yet but one-year smolts of 400 grams can be produced for subsequent rearing in sea-pens or land-units.

85-002028 Bams, R. A. COMPARISON OF THREE INSTREAM INCUBATION TECHNIQUES FOR COHO SALMON. *N. Am. J. Fish. Manage.* 5(2A):159-172. 1985. SFA 30(3)
[Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

85-002029 Cummings, E. DEVELOPMENT OF STATE REGULATIONS AND PRIVATE SALMON HATCHERIES IN OREGON. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 16-20. 1981. Available @ $7.00

TROUT AND SALMON CULTURE (CONTINUED)

85-002029 CONTINUED from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)

[Oreg. Dep. Fish Wildl., Portland 97208] Private salmon hatcheries have been permitted to produce coho (*Oncorhynchus kisutch*), chinook, (*O. tshawytscha*), and chum (*O. keta*) salmon in Oregon. Pink salmon (*O. gorbuscha*) permits are allowed, but none have been issued. Evaluation of existing operations is continuing while a moratorium has been imposed on new sites for the species now permitted. Egg supplies have limited development, but returns to public fisheries and to private sites this year give rise to some optimism on the part of the operators.

85-002030 Kerns, C. SOUTH CENTRAL ALASKAN SALMON RANCHING: 1981. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 28-30. 1981. Available @ $7.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)

[Alaska Sea Grant Prog., Juneau 99801]

85-002031 McNeil, W. J. THE PRIVATE SECTOR'S ROLE IN SALMON RANCHING. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 21. 1981. Available @ $7.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)

[Oregon Aqua-Foods, Inc., Springfield, OR 97477]

85-002032 McNeil, W. J. WORLD SALMON RANCHING: STATUS AND OUTLOOK. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 13-15. 1981. Available @ $7.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)

[Oregon Aqua-Foods, Inc., Springfield, OR 97477] Salmon ranching continues to exhibit steady growth, expanding from about 2.1 billion juveniles released in 1974 (McNeil, 1979) to about 3.0 billion in 1980 (Allee, 1981). Future expansion is expected to remain rapid in Asia and North America. Chum (*Oncorhynchus keta*) and pink (*O. gorbuscha*) salmon are the primary species used for ranching (55 and 30 percent by number of juveniles released, respectively). Other important Pacific salmon species used for ranching include chinook (*O. tshawytscha*) (6%), sockeye (*O. nerka*) (4%), and coho (*O. kisutch*) (3%). *Salmo sp.* collectively contribute 2 percent of the number of juvenile salmonids released for ranching.

85-002033 Morkramer, S.; G. Hörstgen-Schwark and H. J. Langholz. COMPARISON OF DIFFERENT EUROPEAN RAINBOW TROUT POPULATIONS UNDER INTENSIVE PRODUCTION CONDITIONS. *Aquaculture* 44(4):303-320. 1985. SFA 30(3)

[Inst. Tierzucht Haustiergenet. Univ. Göttingen, Albrecht, Thaer-Weg 1, 3400 Göttingen, West Germany]

85-002034 Pärjälä, E.; A. Tamminen and O. V. Lindqvist. POLLUTION LOADINGS FROM FINNISH INLAND FISH-FARMS: A CASE STUDY. *Aqua Fenn.* 14(2):205-214. 1984. SFA 30(3)

[Univ. Kuopio, Dep. Occu. Indus. Hygiene, PB6, SF-70211 Kuopio, Finland] Pollution loadings of fish-farm with raceways producing annually 200 tons of rainbow trout in Central Finland have been studied from May to October in 1983. The effluents of the farm had total phosphorus concentration of 34-120 µg/l, total nitrogen concentration of 580-1300 µg/l, suspended solids (SS) concentration of 1-9 mg/l and BOD_7 2.3-5.1 mg O_2/l. Pollution loadings of the farm were 9.0-20.5 gP/kg of fish, 6.0-9.7 gP/kg of feed, 48-108 gN/kg of fish, 26-170 gN/kg of feed, 3.1-19.4 gSS/kg of fish, 5.2-19.5 gSS/kg of feed, 0.2-0.7 g BOD/kg of fish and

TROUT AND SALMON CULTURE (CONTINUED)

85-002034 CONTINUED 0.4-1.1 g BOD/kg of feed. More than 50% of total phosphorus and more than 70% of total nitrogen in the effluents was in soluble forms. Almost all of the phosphorus loading consisted of PO_4-P. The main part of nitrogen loading consisted of NH_4-N and organic nitrogen compounds. Phosphorus and nitrogen leach very quickly and effectively from the sludge which gathers on the bottom of the raceways. The sludge should be removed once or twice a week from the bottom of the raceways in order to effectively decrease phosphorus and nitrogen loadings.

85-002035 Pepper, V. A. and D. Stansbury. WEIGHT AND LENGTH VARIABILITY OF SWIM-UP ATLANTIC SALMON FRY AS AN INDICATOR OF INCUBATION EFFICIENCY. *Prog. Fish-Cult.* 47(1):27-33. 1985. SFA 30(3)
[Fish. Res. Br., Dep. Fish. Oceans, P.O. Box 5667, St. John's, NF A1C 5X1, Canada]

85-002036 Poon, D. AN OVERVIEW OF SALMON OCEAN RANCHING IN SOUTHEAST ALASKA. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 22-27. 1981. Available @ $7.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[130 Vasquez Ave., San Francisco, CA 94127]

85-002037 Schreck, C. B.; R. Patino; C. K. Pring; J. R. Winton and J. E. Holway. EFFECTS OF REARING DENSITY ON INDICES OF SMOLTIFICATION AND PERFORMANCE OF COHO SALMON, *ONCORHYNCHUS KISUTCH*. *Aquaculture* 45(1-4):345-358. 1985. SFA 30(3)
[Oreg. Coop. Fish. Res. Unit, Oreg. State Univ., Corvallis 97331]

85-002038 Storebakken, T.; P. Foss; E. Austreng and S. Liaaen-Jensen. CAROTENOIDS IN DIETS FOR SALMONIDS. II. EPIMERIZATION STUDIES WITH ASTAXANTHIN IN ATLANTIC SALMON. *Aquaculture* 44(4):259-269. 1985. SFA 30(3)
[Dep. Poultry Fur Anim. Sci., Agric. Univ. Norway, N-1432 AS-NLH, Norway] Atlantic salmon (*Salmo salar*, L.), kept in sea pens were fed diets containing pure carotenoids. No significant preferential utilization of the (3S, 3'S), (3R, 3'S) or (3R, 3'R) optical isomers of astaxanthin was observed. No epimerization occurred in the flesh at the chiral centres at C-3 and C-3' in astaxanthin.

85-002039 Torrissen, O. J. PIGMENTATION OF SALMONIDS: FACTORS AFFECTING CAROTENOID DEPOSITION IN RAINBOW TROUT (*SALMO GAIRDNERI*). *Aquaculture* 46(2):133-142. 1985. SFA 30(3)
[Matre Aquacult. Stn., Inst. Mar. Res., Dir. Fish., N-5198 Matredal, Norway]

OTHER ANADROMOUS SPECIES CULTURE

85-002040 Geiger, J. G. and N. C. Parker. SURVEY OF STRIPED BASS HATCHERY MANAGEMENT IN THE SOUTHEASTERN UNITED STATES. *Prog. Fish-Cult.* 47(1):1-13. 1985. SFA 30(3)
[Tex. Parks Wildl. Dep., 4200 South School Rd., Austin 78744]

WARMWATER CULTURE

85-002041 Bedawi, R. M. RECRUITMENT CONTROL AND PRODUCTION OF MARKET-SIZE *OREOCHROMIS NILOTICUS* WITH THE PREDATOR *LATES NILOTICUS* L. IN THE SUDAN. *J. Fish Biol.* 26(4):459-464. 1985. SFA 30(3)

[Zool. Dep., Coll. Sci., King Saud Univ., Riyadh, Saudi Arabia] Experiments were conducted in earth ponds (242-1260 m^2) to evaluate the Nile perch (*Lates niloticus* L.) as a predator for recruitment control and the production of marketable *Oreochromis niloticus* L. in the Sudan. Supply of the predatory fish was maintained by induced spawning of *L. niloticus* brooders by raising the water level in a 1.0 ha earth pond. *Lates niloticus* fingerlings (7.5 cm total length) were then stocked with same size *O. niloticus* at the ratios 1:5, 1:10 and 1:15, *Lates:Oreochromis*, respectively. Over a period of 7 months *Lates niloticus* reduced young (≤ 50 g) *Oreochromis* population and enhanced the production of preferred-size (≥ 200 g) *Oreochromis*. The ratio 1:5 *Lates:Oreochromis* was established to be the most desirable for *Lates*, with a total production of 0.2428 kg/m^2 of *O. niloticus* with 55.7% (by weight) at the target size averaging 287.5 g. The ratios 1:10 and 1:15 produced 0.2106 and 0.2153 kg m^2 of *O. niloticus*, with 49.4% and 16.9% averaging 235.0 and 210.0 g, respectively.

85-002042 Bennett, D. W. SANITARY SIGNIFICANCE O" COLIFORMS IN CATFISH PRODUCTION RACEWAYS. *Tenn. Tech J.* 19:67-68. 1984. Abstract only. SFA 30(3)

85-002043 Bondari, K.; G. O. Ware; B. G. Mullinix, Jr. and J. A. Joyce. INFLUENCE OF BROOD FISH SIZE ON THE BREEDING PERFORMANCE OF CHANNEL CATFISH. *Prog. Fish-Cult.* 47(1):21-26. 1985. SFA 30(3)

[Coastal Plain Exp. Stn., Univ. Ga., Tifton 31793]

85-002044 Boyd, C. E. CHEMICAL BUDGETS FOR CHANNEL CATFISH PONDS. *Trans. Am. Fish. Soc.* 114(2):291-298. 1985. SFA 30(3)

[Dep. Fish. Allied Aquacult., Ala. Agric. Exp. Stn., Auburn Univ., AL 36849]

85-002045 Burlakov, A. B. and Y. V. Khapchayeva. SEXUAL SPECIFICITY OF HYPOPHYSIAL GONADOTROPINS OF RUSSIAN STURGEON, *ACIPENSER GUELDENSTAEDTI* (ACIPENSERIDAE). II. BIOLOGICAL EFFECT OF GONADOTROPINS OF HIGH ELECTROPHORETIC MOBILITY ON MATURATION AND OVULATION OF OOCYTES OF THE LOACH *MISGURNUS FOSSILIS* (COBITIDAE). *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 24(5):18-28. 1984. SFA 30(3)

[Biol. Fac., Moscow Univ., USSR] A comparative investigation was made into the biological effect of hypophysial gonadotropic hormones (HGH) of the Russian sturgeon, *Acipenser gueldenstaedti*, with sexual specificity and a high electrophoretic mobility both in the entire organism *in vivo* and in target tissue *in vitro* on the maturation and ovulation of oocytes of the loach, *Misgurnus fossilis*. It is shown that the gonadotropins of this group extracted from the pituitary glands of males and females have a different electrophoretic mobility: $HGH^{\circ} - 0.41 \pm 0.01$.

85-002046 De Leeuw, R.; H. J. T. Goos; C. J. J. Richter and E. H. Eding. PIMOZIDE-LHRHa-INDUCED BREEDING OF THE AFRICAN CATFISH, *CLARIAS GARIEPINUS* (BURCHELL). *Aquaculture* 44(4):295-302. 1985. SFA 30(3)

[Zool. Lab., Res. Group Comp. Endocrinol., P.O. Box 80.058, State Univ. Utrecht, Netherlands]

85-002047 Degani, G.; D. Levanon and C. Dosoretz. GROWTH OF *ANGUILLA ANGUILLA* IN DIFFERENT DENSITIES IN OUT-DOOR CONTAINERS WITH *TILAPIA AUREA*. *Prog. Fish-Cult.* 47(2):114-118. 1985. SFA 30(3)

[Galilee Technol. Cent., Kiryat Shmona, 10200, Israel]

WARMWATER CULTURE (CONTINUED)

85-002048 Dunham, R. A. and R. O. Smitherman. EFFECTS OF SELECTING FOR GROWTH RATE ON REPRODUCTIVE PERFORMANCE IN CHANNEL CATFISH. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:182-189. 1982. SFA 30(3)

[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36849] Two populations of channel catfish (*Ictalurus punctatus*) with different histories of domestication - Marion (Alabama) and Kansas - were grown in earthen ponds at 7,500/ha. The largest 10% of each population were selected when population mean weights were 500 g. The reproductive performance of these selects was compared to that of brood from random control populations. Data were analyzed for each strain then pooled and re-analyzed. No differences were found in spawning day, spawning rate, hatchability of eggs and survival of sac fry. Fecundity (eggs deposited) was increased ($P<0.05$) in the pooled select brood fish. Fingerling output was also higher for selects ($P<0.05$) in the Marion and pooled populations, but lower ($P<0.05$) in the Kansas select population. Fecundity, sac fry survival, and fry survival had the largest effects on fingerling output. Selecting for growth rate did not decrease the reproductive performance (fingerling output) in channel catfish, and some improvement in reproductive performance was evident.

85-002049 Goudie, C. A. TISSUE DISTRIBUTION AND ELIMINATION OF RADIOLABELLED METHYLTESTOSTERONE ADMINISTERED IN THE DIET TO SEXUALLY UNDIFFERENTIATED AND ADULT TILAPIA, *TILAPIA (OREOCHROMIS) AUREA*. *Ph.D. dissertation, Auburn Univ.* 153p. 1984. From Diss. Abstr. Int. B Sci. Eng. 45(12):3731. 1985. SFA 30(3)

85-002050 Grizzle, J. M.; A. C. Mauldin II; D. Young and E. Henderson. SURVIVAL OF JUVENILE STRIPED BASS (*MORONE SAXATILIS*) AND *MORONE* HYBRID BASS (*MORONE CHRYSOPS* X *MORONE SAXATILIS*) INCREASED BY ADDITION OF CALCIUM TO SOFT WATER. *Aquaculture* 46(2):167-171. 1985. SFA 30(3)

[Dep. Fish. Allied Aquacult., Ala. Agric. Exp. Stn., Auburn Univ., AL 36849] $CaCl_2$ was used to increase the total hardness of water in three ponds from 20 to 45-100 mg/l as $CaCO_3$ 5 days before harvest. $CaCl_2$ was also used to increase hardness from 10 to 70-200 mg/l as $CaCO_3$ in water used for holding and transporting fish after they were harvested from ponds. All groups of fish in water containing additional calcium had 80-99% survival compared with 16% survival for a group of fish without additional calcium in the water before or after harvest. Addition of 1% NaCl to the water did not increase survival.

85-002051 Hollerman, W. D. and C. E. Boyd. EFFECTS OF ANNUAL DRAINING ON WATER QUALITY AND PRODUCTION OF CHANNEL CATFISH IN PONDS. *Aquaculture* 46(1):45-54. 1985. SFA 30(3)

[Dep. Fish. Allied Aquacult., Ala. Agric. Exp. Stn., Auburn Univ., AL 36849]

85-002052 Hulata, G.; S. Rothbard; J. Itzkovich; G. Wohlfarth and A. Halevy. DIFFERENCES IN HYBRID FRY PRODUCTION BETWEEN TWO STRAINS OF THE NILE TILAPIA. *Prog. Fish-Cult.* 47(1):42-49. 1985. SFA 30(3)

[Fish Breeding Cent., Gan Shmuel, 38810, Israel]

85-002053 Keenum, M. E. and J. G. Dillard. OPERATIONAL CHARACTERISTICS AND COSTS OF CUSTOM HARVESTING AND HAULING FARM-RAISED CATFISH. *Miss. Agric. For. Exp. Stn. Agric. Econ. Res. Rep.* No. 153. 22p. 1984. SFA 30(3)

[Miss. Agric. For. Exp. Stn., Mississippi State 39762]

WARMWATER CULTURE (CONTINUED)

85-002054 Lam, T. J. and R. Sharma. EFFECTS OF SALINITY AND THYROXINE ON LARVAL SURVIVAL, GROWTH AND DEVELOPMENT IN THE CARP, *CYPRINUS CARPIO*. *Aquaculture* 44(3):201-212. 1985. SFA 30(3)

The survival, growth and development of carp larvae *(Cyprinus carpio)* increased with increasing salinity of the ambient medium from fresh water to 10% sea water (3°/oo). The salinities investigated (1, 5 and 10% SW or 0.3, 1.5 and 3°/oo respectively) also appeared to enhance the viability and hatchability of the eggs compared with fresh water, although not increasingly. Thyroxine (Eltroxin, Glaxo) further improved egg viability and hatchability, and promoted larval survival, growth and development, but the relative efficacy of the different concentrations of thyroxine in the ambient medium (0.01, 0.05 and 0.1 ppm) depended on the salinity of the medium. The results may find application in the improvement of carp larval rearing.

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85-002431 CONTINUED laboratory studies and field observations on the ontogeny of feeding, predator-avoidance, and agonistic behaviour in largemouth bass, *Micropterus salmoides*, rock bass, *Ambloplites rupestris*, and pumpkinseed, *Lepomis gibbosus*, young indicate that the order of appearance of the various behavioural systems enhances the survival of the young. In the laboratory, all species spend significantly more time feeding during the first weeks of free-swimming than the later weeks. During a corresponding period in the field the young are either occupying an offshore area low in predators (rock bass, pumpkinseed) or are being guarded by a parent (largemouth bass); thus the risk of predation is low. When the young are in a predator-rich environment (inshore) both the predator-avoidance response and agonistic behaviour are well developed. Agonistic behaviour is the last to appear and may serve to disperse the young. Dispersal may relate to the feeding mode of the various species and may also reduce the probability of predation. It is apparent that the sequential onsets of the behavioural systems are in concert with ecological events and selective pressures confronting centrarchid young.

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[Dep. Fish. Wildl. Sci., VPI&SU, Blacksburg, VA 24061] Agonistic behavior and social dominance relationships between similar-sized, wild, adult brook trout *(Salvelinus fontinalis)* and rainbow trout *(Salmo gairdneri)* were examined in a laboratory stream. Frequency of movements, aggressive encounters, and consumption of food items by trout when held as single specimens, intraspecific pairs, and interspecific pairs were compared. Rainbow trout were more mobile, aggressive, and successful foragers on drifting prey than brook trout; however, neither species appeared to possess a competitive advantage in establishing social dominance or displacing interspecific rivals. Brook trout were dominant in 9 of 14 interspecific matches. Female trout were dominant in 6 of 10 opposite-sex matches. Dominant trout, regardless of species or sex, exhibited significantly greater mobility, aggressiveness, and feeding success than subordinate trout.

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85-002442 Larimore, R. W. and D. D. Garrels. ASSESSING HABITATS USED BY WARMWATER STREAM FISHES. *Fisheries (Bull. Am. Fish. Soc.)* 10(2):10-16. 1985. SFA 30(3)
[Ill. Nat. Hist. Serv., Urbana] Five methods were developed for locating and identifying an undisturbed free-swimming, stream fish. These methods used (1) color-coded tags, (2) fixed electrodes, (3) optical measurements, (4) night collections, and (5) radiotelemetry. They permitted observations of most kinds of fishes, at any time of day or night, during any season (including under ice), and from streams of different sizes. Although no one method was equally useful in all situations, the methods were evaluated according to their effectiveness in determining habitat preferences of different fish species under various stream conditions. The importance of precision in locating a fish and its habitat was emphasized by our finding significant differences in physical measurements over extremely small areas.

85-002443 Larson, G. L. and S. E. Moore. ENCROACHMENT OF EXOTIC RAINBOW TROUT INTO STREAM POPULATIONS OF NATIVE BROOK TROUT IN THE SOUTHERN APPALACHIAN MOUNTAINS. *Trans. Am. Fish. Soc.* 114(2):195-203. 1985. SFA 30(3)
[Coop. Park Stud. Unit, Sch. For., Oreg. State Univ., Corvallis, 97331]

85-002444 Legault, M. and L. Lalancette. [TIME OF ADJUSTMENT OF BUOYANCY OF HATCHERY-REARED JUVENILE ATLANTIC SALMON *(SALMO SALAR)* COMPARED TO WILD FISH.] *Can. J. Fish. Aquatic Sci.* 42(3):619-623. 1985.

BEHAVIOR (CONTINUED)

85-002444 CONTINUED In French with English summ. SFA 30(3)
[Dep. Sci. Fond., Univ. Quebec à Chicoutimi, 555, boul. de l'Univ., Chicoutimi, PQ G7H 2B1, Canada]

85-002445 Long, L. V. and T. Aoyama. PHOTOGRAPHIC MEASUREMENT FOR OBTAINING THE LENGTH, ASPECT AND BEARING OF FREE-SWIMMING FISH FROM THEIR SPATIAL POSITION. *Bull. Jpn. Soc. Sci. Fish.* 51(2):191-195. 1985. SFA 30(3)
[Ocean Res. Inst., Univ. Tokyo, Nakano, Tokyo 164, Japan] A method was designed for measuring the spatial position of an arbitrary point in the field of view of an underwater stereo camera system. The distance between camera lens and fish, the size of fish, the aspect angle of fish in the field of view of the camera, and the bearing angle of fish relative to the camera optical axis can be calculated with high accuracy by using this method. In the future, by use of a combination system of the stereo camera and an echo sounder, it will be possible to obtain the echo level of fish in the sound beam and the above information derived from the simultaneous stereo photographs. Thus, it is expected that accurate estimation of the *in situ* acoustic target strength of fish will be possible.

85-002446 Long, L. V.; T. Aoyama and T. Inagaki. A STEREO PHOTOGRAPHIC METHOD FOR MEASURING THE SPATIAL POSITION OF FISH. *Bull. Jp . Soc. Sci. Fish.* 51(2):183-190. 1985. In Japanese with English summ. SFA 30(3)
[Ocean Res. Inst., Univ. Tokyo, Nakano, Tokyo 164, Japan] In studies of fish behavior or the ecology of schooling fish and in estimating fish biomass, information on fish position and size are required. A method was designed for determining the position of fish in three dimensions using stereo photographs taken with an under water stereo camera system. From the obtained fish positions, the distance between fish and the camera, the size, aspect and bearing angles of fish positions, the distance between fish and the camera were calculated. The absolute errors in measurement using the present method are 0.75% for length and 0.77% for distance. The method can be successfully applied to fish with any aspect within the field of view of the stereo camera system. The results suggest that *in situ* information on fish can be studied in detail using this technique.

85-002447 Mahon, R. and C. B. Portt. LOCAL SIZE RELATED SEGREGATION OF FISHES IN STREAMS. *Arch. Hydrobiol.* 103(2):267-271. 1985. SFA 30(3)
[Bedford Inst. Oceanogr., Dartmouth, NS B2Y 4A2, Canada] Fishes inhabiting reaches of two small streams in southern Ontario were found to segregate locally by size between riffle, raceway, and pool. Both within and among species there was a gradient of increasing size from riffles through raceways to pools.

85-002448 Malizia, A. A., Jr.; K. S. Bloom and E. G. Ellgaard. THE EFFECTS OF TEMPERATURE ON THE LOCOMOTOR ACTIVITY OF THE BLUEGILL SUNFISH, *LEPOMIS MACROCHIRUS*. *Proc. La. Acad. Sci.* 47:10-14. 1984. SFA 30(3)
[Dep. Biol., Tulane Univ., New Orleans, LA 70118]

85-002449 Matthews, W. J. DISTRIBUTION OF MIDWESTERN FISHES ON MULTIVARIATE ENVIRONMENTAL GRADIENTS, WITH EMPHASIS ON *NOTROPIS LUTRENSIS*. *Am. Midl. Nat.* 113(2):225-237. 1985. SFA 30(3)
[Biol. Stn., Univ. Okla., Kingston 73439]

85-002450 Myrburg, A. A. and R. J. Riggio. ACOUSTICALLY MEDIATED INDIVIDUAL RECOGNITION BY A CORAL REEF FISH (*POMACENTRUS PARTITUS*). *Anim. Behav.* 33(2):411-416. 1985. SFA 30(3)
[Rosentiel Sch. Mar. Atmos. Sci., Univ. Miami, Miami, FL 33149]

BEHAVIOR (CONTINUED)

85-002451 Otterlind, G. COD MIGRATION AND TRANSPLANTATION EXPERIMENTS IN THE BALTIC. *J. Appl. Ichthyol.* 1(1):3-16. 1985. In English with German and French summ. SFA 30(3)
[Havsfiskelab., Box 4, S-45308 Lysekil, Sweden]

85-002452 Pavlov, D. S.; G. I. Ol'khovskaya; N. V. Strel'tsova; A. A. Chistyakov; A. M. Boldyrev and V. N. Starostin. SWIMMING ENDURANCE OF SOME FISHES AT DIFFERENT SPEEDS. *Dokl. Biol. Sci. (Engl. Transl. Dokl. Akad. Nauk SSSR Ser. Biol.)* 278(1-6):566-568. 1985. SFA 30(3)
[A. N. Severtsev Inst. Evol. Morphol. Anim. Ecol., Acad. Sci. USSR, Moscow, USSR]

85-002453 Penn, J. S. EFFECTS OF CONTINUOUS LIGHT ON THE RETINA OF A FISH, *NOTEMIGONUS CRYSOLEUCAS*. *J. Comp. Neurol.* 238(1):121-127. 1985. SFA 30(3)
[Inst. Molec. Biophys., Fla. State Univ., Tallahassee 32306]

85-002454 Rehnberg, B. G.; L. Curtis and C. B. Schreck. HOMING OF COHO SALMON *(ONCORHYNCHUS KISUTCH)* EXPOSED TO MORPHOLINE. *Aquaculture* 44(3):253-255. 1985. SFA 30(3)
[Oreg. Coop. Fish. Res. Unit, Oreg State Univ., Corvallis 97331] Smolts of coho salmon *(Oncorhynchus kisutch)* were exposed to 5 X 10^{-5} $mg \cdot l^{-1}$ morpholine for 15 days and released into the Salmon River along with an unexposed control group. During the following two autumns, morpholine was introduced into the hatchery's fish ladder on various days and the return of experimental fish was recorded. The returns of morpholine-exposed and control fish were not statistically different. With morpholine present in the fish ladder, control fish were not repelled, and with morpholine absent from the ladder, morpholine-exposed fish returned as readily as control fish.

85-002455 Schwarz, A. L. THE BEHAVIOR OF FISHES IN THEIR ACOUSTIC ENVIRONMENT. *Environ. Biol. Fishes* 13(1):3-15. 1985. SFA 30(3)
[101-1484 Charles St., Vancouver, BC V5L 2S8, Canada]

85-002456 Sheppard, J. D. and J. H. Johnson. PROBABILITY-OF-USE FOR DEPTH, VELOCITY, AND SUBSTRATE BY SUBYEARLING COHO SALMON AND STEELHEAD IN LAKE ONTARIO TRIBUTARY STREAMS. *N. Am. J. Fish. Manage.* 5(2B):277-282. 1985. SFA 30(3)
[N.Y. State Dep. Environ. Conserv., Bur. Environ. Prot., 50 Wolf Rd., Albany, NY 12233]

85-002457 Sorenson, P. W. THE USE OF OLFACTION BY MIGRATING ELVERS OF THE AMERICAN EEL, *ANGUILLA ROSTARTA* (LESUEUR). *Ph.D. dissertation, Univ. R.I.* 252p. 1984. From Diss. Abstr. Int. B Sci. Eng. 45(11):3444. 1985. SFA 30(3)

85-002458 Steele, C. W. NON-RANDOM, SEASONAL OSCILLATIONS IN THE ORIENTATION AND LOCOMOTOR ACTIVITY OF SEA CATFISH (*ARIUS FELIS*) IN A MULTIPLE-CHOICE SITUATION. *Biol. Bull.* 168(3):359-376. 1985. SFA 30(3)
[Dep. Biol., Tex. A&M Univ., College Station 77843] A quantitative analysis of angular orientation and locomotor activity of 80 sea catfish (*Arius felis*) over 12 consecutive months, under controlled conditions of photoperiod, temperature, and water quality, revealed non-random oscillations in the monthly mean orientation vectors and monthly mean activity of the experimental population. Marquardt modeling of monthly mean activity and of the sine and cosine components of monthly mean orientation indicated significant annual, bimodal cycles for all three variables. These cycles correlated with the observed, seasonal inshore-offshore migrations of *A.*

BEHAVIOR (CONTINUED)

85-002458 CONTINUED *felis*, as documented in the literature, and had significant periods of 11.40, 5.11, and 6.64 months for the sine and cosine components of orientation and for activity, respectively. Photoperiod alone apparently acted as the exogenous cue triggering these cyclic changes in orientation and activity.

85-002459 Takahashi, M.; S. Murachi; S. Moriwaki and S. Ogawa. THE EFFECTS OF LIGHT SIGNAL UPON THE CONDITIONED FEEDING RESPONSE OF BLUEGILL SUNFISH *LEPOMIS MACROCHIRUS*. *Bull. Jpn. Soc. Sci. Fish.* 51(4):543-548. 1985. SFA 30(3)
[Fac. Appl. Biol. Sci., Hiroshima Univ., Fukuyama 720, Japan]

85-002460 Townshend, T. J. and R. J. Wootton. AJUSTING PARENTAL INVESTMENT TO CHANGING ENVIRONMENTAL CONDITIONS: THE EFFECT OF FOOD RATION ON PARENTAL BEHAVIOUR OF THE CONVICT CICHLID, *CICHLASOMA NIGROFASCIATUM*. *Anim. Behav.* 33(2):494-502. 1985. SFA 30(3)
[Dep. Zool., Univ. Coll. Wales, Aberystwyth S423 3DA, U.K.]

85-002461 Tsukamoto, K.; K. Uchida; Y. Murakami; M. Endo and T. Kajihara. DENSITY EFFECT ON JUMPING BEHAVIOR AND SWIMMING UPSTREAM IN THE AYU JUVENILES. *Bull. Jpn. Soc. Sci. Fish.* 51(2):323. 1985. SFA 30(3)
[Ocean Res. Inst., Univ. Tokyo, Nakano, Tokyo 164, Japan]

85-002462 Vaissiére, R.; P. Perno and C. Charreau. [ANNOTATED BIBLIOGRAPHY OF INVESTIGATIONS ON BIOLOGICAL SOUNDS FROM MARINE ANIMALS WITH THE EXCEPTION OF MAMMALS.] *Bull. Inst. Oceanogr. (Monaco)* 72(1432):1-62. 1977. In French with English summ. SFA 30(3)

85-002463 Van den Berg, A. V. and A. Schuijf. ACOUSTICS OF A STANDING WAVE TANK FOR STUDYING THE HEARING CAPACITY OF FISH. *J. Acoust. Soc. Am.* 78(1):12-16. 1985. SFA 30(3)
[Fysiol. I, Med. Fac., Erasmus Univ., Burg. Audlaan 50, 3062 PA Rotterdam, Netherlands]

85-002464 Whoriskey, F. G.; A. Gaudreault; N. Martel; S. Campeau and G. J. Fitzgerald. THE ACTIVITY BUDGET AND BEHAVIOR PATTERNS OF FEMALE THREESPINE STICKLEBACKS, *GASTEROSTEUS ACULEATUS* (L.), IN A QUÉBEC TIDAL SALT MARSH. *Nat. Can. (Que.)* 112(1):113-118. 1985. In English with French summ. SFA 30(3)
[Dep. Biol., Univ. Laval, PQ G1K 7P4, Canada]

85-002465 Yasunaga, Y. [MEASUREMENT OF SWIMMING SPEED OF FLOUNDER LARVAE *PARALICHTYS OLIVACEUS* WITH A SMALL STRAIGHT CHANNEL.] *Bull. Jpn. Soc. Sci. Fish.* 51(2):227-231. 1985. In Japanese with English summ. SFA 30(3)
[Natl. Res. Inst. Fish. Eng., Ebidai, Hazaki, 314-04, Japan]

85-002466 Yasunaga, Y. [STUDIES OF CONTINUATION OF SWIMMING BEHAVIOUR OF FLOUNDER LARVAE *PARALICHTYS OLIVACEUS* WITH A SMALL CIRCULATION CHANNEL.] *Bull. Jpn. Soc. Sci. Fish.* 51(2):233-237. 1985. In Japanese with English summ. SFA 30(3)
[Natl. Res. Inst. Fish. Eng., Ebidai, Hazaki, 314-04, Japan]

LIFE HISTORY-GENERAL WORKS

85-002467 Bugayev, V. G. THE ROLE OF BRACKISH LAKE NERPICH'YE IN THE FORAGING OF YOUNG KAMCHATKA RIVER SOCKEYE SALMON, *ONCORHYNCHUS NERKA* (SALMONIDAE). *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 24(5):91-97. 1984. SFA 30(3)
[KoTINRO, Petropavlovsk-Kamchatskiy, USSR]

85-002468 Crabtree, R. E.; K. J. Sulak and J. A. Musick. BIOLOGY AND DISTRIBUTION OF SPECIES OF *POLYACANTHONOTUS* (PISCES: NOTACANTHIFORMES) IN THE WESTERN NORTH ATLANTIC. *Bull. Mar. Sci.* 36(2):235-248. 1985. SFA 30(3)
[Dep. Ichthyol., Va. Inst. Mar. Sci., Coll. William and Mary, Gloucester Point, VA 23062]

85-002469 Dempson, J. B. and J. M. Green. LIFE HISTORY OF ANADROMOUS ARCTIC CHARR, *SALVELINUS ALPINUS*, IN THE FRASER RIVER, NORTHERN LABRADOR. *Can. J. Zool.* 63(2):315-324. 1985. In English with French summ. SFA 30(3)
[Fish. Res. Br., Dep. Fish. Oceans, P.O. Box 5667, St. John's, NF A1C 5X1, Canada]

85-002470 Gordon, J. D. M. and J. A. R. Duncan. THE BIOLOGY OF FISH OF THE FAMILY MORIDAE IN THE DEEP-WATER OF THE ROCKALL TROUGH. *J. Mar. Biol. Assoc. U.K.* 65(2):475-485. 1985. SFA 30(3)
[Scot. Mar. Biol. Assoc., Dunstaffinage Mar. Res. Lab., P.O. Box 3, Oban, Argyll, PA34 4AD, Scotland]

85-002471 Heins, D. C. LIFE HISTORY TRAITS OF THE FLORIDA SAND DARTER *AMMOCRYPTA BIFASCIA*, AND COMPARISONS WITH THE NAKED SAND DARTER *AMMOCRYPTA BEANI*. *Am. Midl. Nat.* 113(2):209-216. 1985. SFA 30(3)
[Biol. Dep., Tulane Univ., New Orleans, LA 70118]

85-002472 Jennings, T. R. SURVIVAL, GROWTH AND FOOD HABITS OF YOUNG-OF-THE-YEAR ARCTIC GRAYLING STOCKED IN BARREN, SUB-ARCTIC LAKES. *M. S. thesis, Univ. Alaska* 71p. 1983. From Masters Abstr. 23(1):122. 1985. SFA 30(3)
Since 1975 the Alaska Department of Fish and Game has used small, barren lakes near Delta Junction for the rearing of Arctic grayling. Sac-fry are stocked in June, reared for one summer, then recaptured and transplanted in September into the Delta Clearwater River. Survival was examined at various stocking densities (number/hectare) of sac-fry. No correlation existed between stocking density and survival over the range of densities tested (833 to 9,635 sac-fry/hectare). Qualitative evidence suggested that the high rate of mortality within a month after stocking was associated with specific food requirements at time of first feeding, sac-fry mobility and fitness, and predation by invertebrates. Growth rates were almost 2.0 mm/day in June, decreased to 0.5mm/day by September and averaged over 1.0 mm/day for the entire summer. Larvae ate mainly chironomid pupae; diversity of food items increased with fish size and age.

85-002473 Jonsson, B. LIFE HISTORY PATTERNS OF FRESHWATER RESIDENT AND SEA-RUN MIGRANT BROWN TROUT IN NORWAY. *Trans. Am. Fish. Soc.* 114(2):182-194. 1985. SFA 30(3)
[Dir. Wildl. Freshwater Fish., Fish. Res. Div., Tungasletta 2, N-7000 Trondheim, Norway]

LIFE HISTORY-GENERAL WORKS (CONTINUED)

85-002474 Kim, Y. G. STUDIES ON THE LIFE HISTORY OF *BACCIGER HARENGULAE*. *Bull. Korean Fish. Soc.* 17(5):449-470. 1984. From Korean Sci. Abstr. 16(6):42. 1984. SFA 30(3)

85-002475 Larson, H. K. NOTES ON THE BIOLOGY OF THE GOBY *KELLOGGELLA CARDINALIS* (JORDAN & SEALE). *Micronesica* 19(1-2):157-164. 1983. SFA 30(3)
[North Terr. Mus. Arts Sci., Bullocky Point, Fannie Bay, P.O. Box 4646, Darwin, N.T. 5794, Australia]

85-002476 Love, M. S.; G. E. McGowen; W. Westphal; R. J. Lavenberg and L. Martin. ASPECTS OF THE LIFE HISTORY AND FISHERY OF THE WHITE CROAKER, *GENYONEMUS LINEATUS* (SCIAENIDAE), OFF CALIFORNIA. *NOAA Fish. Bull.* 82(1):179-198. 1984. SFA 30(3)
[Vantuna Res. Group, Dep. Biol., Occidental Coll., Los Angeles, CA 90041]

85-002477 Mills, C. A. and A. Eloranta. THE BIOLOGY OF *PHOXINUS PHOXINUS* (L.) AND OTHER LITTORAL ZONE FISHES IN LAKE KONNEVESI, CENTRAL FINLAND. *Ann. Zool. Fenn.* 22(1):1-12. 1985. SFA 30(3)
[Freshwater Biol. Assoc., River Lab., East Stoke, Wareham, Dorset BH20 6BB, England]

85-002478 Nammack, M. F.; J. A. Musick and J. A. Colvocoresses. LIFE HISTORY OF SPINY DOGFISH OFF THE NORTHEASTERN UNITED STATES. *Trans. Am. Fish. Soc.* 114(3):367-376. 1985. SFA 30(3)
[Va. Inst. Mar. Sci., Coll. William and Mary, Gloucester Point, VA 23062]

85-002479 Pittenger, G. G. MOVEMENTS, DISTRIBUTION, FEEDING, AND GROWTH OF THE PACIFIC ANGEL SHARK, *SQUATINA CALIFORNICA*, AT CATALINA ISLAND, CALIFORNIA. *M.S. thesis, Calif. State Univ. (Long Beach)* 91p. 1984. From Masters Abstr. 23(1):110. 1985. SFA 30(3)
Long-term movements, distribution, feeding, growth, and population size were examined for the Pacific angel shark, *Squatina californica*, at Catalina Island, California. Results of telemetry tracking and conventional tagging indicated the sharks were a single resident population. They distributed themselves about the island and were found near the rock-sand interface at the base of rocky reefs during the warmer months of the year and farther out on the sand during the colder months. Movements were nocturnal, but did not take place every night. Sharks fed on fishes when near the reef and on squid when farther away. Prey capture is accomplished, at least partly, from ambush when prey swims overhead. Growth rates slowed with increasing length and ranged from 14cm/yr to 0cm/yr with the mean sized shark (108cm) showing a rate of ca. 3.5cm/yr. Population size statistics, based on tag recapture and reobservation data, estimate a total of 3650 angel sharks around Catalina island.

85-002480 Rimmer, M. A. GROWTH, FEEDING AND CONDITION OF THE FORK-TAILED CATFISH *ARIUS GRAEFFEI* KNER & STEINDACHNER (PISCES: ARIIDAE) FROM THE CLARENCE RIVER, NEW SOUTH WALES. *Aust. J. Mar. Freshwater Res.* 36(1):33-39. 1985. SFA 30(3)
[Schl. Biol. Sci., Macquarie Univ., North Ryde, NSW 2113, Australia]

85-002481 Russell, D. J. and R. N. Garrett. EARLY LIFE HISTORY OF BARRAMUNDI, *LATES CALCARIFER* (BLOCH), IN NORTH-EASTERN QUEENSLAND. *Aust. J. Mar. Freshwater Res.* 36(2):191-201. 1985. SFA 30(3)

LIFE HISTORY-GENERAL WORKS (CONTINUED)

85-002481 CONTINUED
[Fish. Res. Stn., Dep. Primary Indus., c/P.O., Burnett Heads, Qld. 4670, Australia] Larval barramundi in the size range 2.8-5.2 mm were collected from plankton in two estuaries in north-eastern Queensland from 31 October 1979 until 13 February 1980. After leaving the plankton, barramundi moved into nearby brackish and freshwater swamps. These areas acted as nursery grounds, offering both protection from predators, and abundant prey in the form of insect larvae, other fish and crustaceans. These habitats exhibit a wide range of salinities (fresh water-44 x 10^3 mg l^{-1}) and surface water temperatures (23-36°C). Juvenile barramundi commenced migration from these swamps into permanent tidal creeks around April where they remained for up to 9 months before dispersal into the estuary, up rivers or along coastal foreshores. The diet of the barramundi in these tidal creeks was exclusively fish and crustaceans. Juvenile barramundi were resident in tidal creeks that had been subjected to substantial human interference through habitat alteration. Destruction of nursery swamps may pose a serious threat to local barramundi stocks near centres of human population on the eastern Queensland coast.

85-002482 Saul, B. M.; J. L. Wilson; D. C. Peterson and J. M. Richardson. FOOD HABITS AND GROWTH OF YOUNG-OF-YEAR WHITE BASS IN TWO EAST TENNESSEE RESERVOIRS. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:115-124 1982. SFA 30(3)
[Dep. For. Wildl. Fish., Univ. Tenn., Knoxville 37901] A total of 791 young-of-year white bass (*Morone chrysops*) from 2 East Tennessee reservoirs were examined to determine food habits and growth. An effort was made to determine when they switched from an insectivorous to a piscivorous diet. White bass in Cherokee Reservoir consumed primarily insects (Chironomidae) during their first year and in Norris Reservoir, primarily zooplankton (Cladocera). When they began consuming fish, young-of-year white bass in Cherokee Reservoir were between 2.5 and 5.0 cm in length while white bass in Norris Reservoir were between 5.0 and 7.5 cm. Numbers of fish consumed by white bass were analyzed as a percentage of numbers of all foods consumed, and as a percentage of foods occurring in the guts of all fish in the study. White bass grew larger (18.4 cm) in Norris than in Cherokee (14.0 cm) during their first year, although mean condition factors were similar in both reservoirs (Norris 0.67 to 1.1, Cherokee 0.86 to 1.21).

85-002483 Saunders, R. L. and C. B. Schom. IMPORTANCE OF THE VARIATION IN LIFE HISTORY PARAMETERS OF ATLANTIC SALMON *(SALMO SALAR). Can. J. Fish. Aquatic Sci.* 42(3):615-618. 1985. In English with French summ. SFA 30(3)
[Biol. Stn., St. Andrews, NB OEG 2X0, Canada]

85-002484 Smith, J. W. and C. A. Wenner. BIOLOGY OF THE SOUTHERN KINGFISH IN THE SOUTH ATLANTIC BIGHT. *Trans. Am. Fish. Soc.* 114(3):356-366. 1985. SFA 30(3)
[NMFS, Beaufort, NC 28516]

85-002485 Sparholt, H. THE POPULATION, SURVIVAL, GROWTH, REPRODUCTION AND FOOD OF ARCTIC CHARR, *SALVELINUS ALPINUS* (L.), IN FOUR UNEXPLOITED LAKES GREENLAND. *J. Fish Biol.* 26(2):313-330. 1985. SFA 30(3)
[Danish Inst. Fish. Mar. Res., Charlottenlund, Denmark] The material comprised 1205 arctic charr caught by gillnets and electrofishing in the ice-free season 1982 in four interconnected lakes. The lakes were similar in biotic and abiotic factors and the arctic charr populations were therefore treated as one population. Two size groups of fish older than three years, called 'small charr' and 'large charr', were found. The two groups differed in feeding habits, growth rates, age of maturity and spawning frequencies. However, they did not differ in the frequencies of the F- and S-serum estrase alleles, and were in accord with the model proposed by Johnson (1976) which

LIFE HISTORY-GENERAL WORKS (CONTINUED)

85-002485 CONTINUED states that the 'small charr' and 'large charr' are two different forms of the same population. 'Small charr' recruit to the 'large charr' by entering a period of fast growth. In the investigated lakes this occurred when the 'small charr' were 3-10 years old. Some indications of rematuration of the 'small charr' when entering the group of 'large charr' were found.

85-002486 Sulak, K. J.; C. A. Wenner; G. R. Sedberry and L. Van Guelpen. THE LIFE HISTORY AND SYSTEMATICS OF DEEP-SEA LIZARD FISHES, GENUS *BATHYSAURUS* (SYNODONTIDAE). *Can. J. Zool.* 63(3):623-642. 1985. In English with French summ. SFA 30(3)

[Inst. Oceanogr. Sci., Brook Rd., Wormely, Godalming, Surrey, GU8 5UB, England]

85-002487 Sule, M. J. and T. M. Skelly. THE LIFE HISTORY OF THE SHORTHEAD REDHORSE, *MOXOSTOMA MACROLEPIDOTUM*, IN THE KANKAKEE RIVER DRAINAGE, ILLINOIS. *Ill. Nat. Hist. Surv. Biol. Notes* No. 123. 16p. 1985. SFA 30(3)

85-002488 Tyler, J. D. and M. N. Granger. NOTES ON FOOD HABITS, SIZE, AND SPAWNING BEHAVIOR OF SPOTTED GAR IN LAKE LAWTONKA, OKLAHOMA. *Proc. Okla. Acad. Sci.* 64:8-10. 1984. SFA 30(3)

[Dep. Biol., Cameron Univ., Lawton, OK 73505] A total of 172 spotted gar (*Lepisosteus oculatus*) was collected from Lake Lawtonka in Comanche County, southwestern Oklahoma, during each spawning season between 6 May 1980 and 10 June 1982. Specimens were weighed, measured, sexed, and stomach contents examined. Total lengths ranged from 422 to 1030 mm and weights from 224 to 4311 g. Only 31 (18%) of the stomachs contained food. Fish constituted 68% and invertebrate organisms 32% of food recovered. Spawning extended from about mid-April to early June and typically occurred in water of 6 to 18 inches depth. Each large female gar was usually attended by 3 to 5 much smaller males.

85-002489 Walsh, S. J. and B. M. Burr. BIOLOGY OF THE STONECAT, *NOTURUS FLAVUS* (SILURIFORMES: ICTALURIDAE), IN CENTRAL ILLINOIS AND MISSOURI STREAMS, AND COMPARISONS WITH GREAT LAKES POPULATIONS AND CONGENERS. *Ohio J. Sci.* 85(3):85-96. 1985. SFA 30(3)

[Dep. Zool., Univ. Fla., Gainesville 32611] Aspects of the general biology of the stonecat, *Noturus flavus*, were analyzed from 261 preserved specimens from Illinois and Missouri streams. Individuals ranged in age from one to 62 mo. The largest specimens examined were a 180-mm SL male and a 165-mm SL female. Females were mature at 3-4 yr and a mean SL of 119.4 mm. Mature oocytes, produced seasonally, ranged from 189 to 570 (bar X = 377.8; N = 12) per female. Seven nests, each containing a clutch of embryos or larvae and guarded by a male, were found under large, flat rocks in pools and riffles. All nest-guarding males were 3 yr old and ranged from 87 to 105 mm SL (bar X = 94.8). Nests were observed in early July at water temperatures of 27 to 29°C. Clutch sizes ranged from 104 to 306+; embryos were spherical, opaque white or light yellow, and ranged in diameter from 2.6 to 4.0 mm (bar X = 3.4mm; N = 40). At hatching, mesolarvae ranged from 6.7 to 7.5 mm TL; development was similar to that described for other ictalurids. Stomachs of adults contained a variety of benthic organisms, primarily aquatic larval insects and decapod crustaceans. Great lakes stonecats live longer, attain a greater maximum size, and have a higher absolute fecundity than southern inland stream populations. Comparisons with congeners indicate that *N. flavus* has life-history traits that are near one extreme within the genus, and they include a longer lifespan and a lower relative fecundity.

85-002490 Ware, D. M. and T. C. Lambert. EARLY LIFE HISTORY OF ATLANTIC MACKEREL *(SCOMBER SCOMBRUS)* IN THE SOUTHERN GULF OF ST. LAWRENCE. *Can. J. Fish. Aquatic Sci.* 42(3):577-592. 1985. In English with French summ.

LIFE HISTORY-GENERAL WORKS (CONTINUED)

85-002490 CONTINUED SFA 30(3)
[Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

85-002491 Wyanski, D. M. and T. E. Targett. JUVENILE DEVELOPMENT OF THE LYRE GOBY, *EVORTHODUS LYRICUS* (GIRARD) (PISCES: GOBIIDAE), WITH A DISCUSSION OF EARLY LIFE HISTORY. *Bull. Mar. Sci.* 36(1):115-123. 1985. SFA 30(3)
[Skidaway Inst. Oceanogr., P.O. Box 13687, Savannah, GA 31416]

POPULATION STUDIES, PRODUCTION, RECRUITMENT, ETC.

85-002492 Alevizon, W.; R. Richardson; P. Pitts and G. Serviss. CORAL ZONATION AND PATTERNS OF COMMUNITY STRUCTURE IN BAHAMIAN REEF FISHES. *Bull. Mar. Sci.* 36(2):304-318. 1985. SFA 30(3)
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85-002493 Anderson, J. L. and J. E. Wilen. ESTIMATING THE POPULATION DYNAMICS OF COHO SALMON *(ONCORHYNCHUS KISUTCH)* USING POOLED TIME-SERIES AND CROSS-SECTIONAL DATA. *Can. J. Fish. Aquatic Sci.* 42(3):459-467. 1985. In English with French summ. SFA 30(3)
[Univ. R. I., Dep. Resour. Econ., Kingston 02881]

85-002494 Beacham, T. D.; F. C. Withler and R. B. Morley. EFFECT OF EGG SIZE ON INCUBATION TIME AND ALEVIN AND FRY SIZE IN CHUM SALMON (*ONCORHYNCHUS KETA*) AND COHO SALMON (*ONCORHYNCHUS KISUTCH*). *Can. J. Zool.* 63(4):847-850. 1985. In English with French summ. SFA 30(3)
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85-002495 Brown, E. H., Jr.; R. W. Rybicki and R. J. Poff. POPULATION DYNAMICS AND INTERAGENCY MANAGEMENT OF THE BLOATER (*COREGONUS HOYI*) IN LAKE MICHIGAN, 1967-1982. *Great Lakes Fish Comm. Tech. Rep.* No. 44. 34p. 1985. SFA 30(3)
[U.S. FWS, Great Lakes Fish. Lab., Ann Arbor, MI 48105] This paper examines the population dynamics of the bloater (*Coregonus hoyi*) in Lake Michigan during a progressive decline in abundance from about the mid-1960s through the mid-1970s, and during a subsequent recovery that is still underway. The study focused on developing a data base and methodology for projecting fishable surpluses, in cooperation with a chub technical committee sponsored by the Great Lakes Fishery Commission. The Technical Committee was formed in 1974 because of depletion of boaters and other deepwater ciscoes or "chubs", as they are known by Great Lakes fishermen. Subsequently the Technical Committee recommended a lakewide ban on chub fishing that was fully enacted by the states of Illinois, Michigan, and Wisconsin in 1976. With the Committee's help, commercial fishery statistics and stock assessment data were obtained from state and federal research files and used with various indirect analytical techniques to estimate relevant population parameters. The lakewide fishable stock in fall 1973, before the fishery was affected by several incomplete closures and then by the lakewide ban, was estimated as 48 to 73 million bloaters weighing 20 to 29 million pounds. Exploitation of the estimated stock varied considerably among 11 statistical districts in the several jurisdictions. Yield to the fishery exceeded production by the stock in some districts. Theoretical yields of bloaters totaling 3.59 to 3.72 million pounds were projected for 1979 from all waters combined. These projected yields were intended as guidelines for experimental quotas that the states

POPULATION STUDIES, PRODUCTION, RECRUITMENT, ETC. (CONTINUED)

85-002495 CONTINUED might establish, because the population had stabilized and the potential for recruitment had improved in most areas.

85-002496 Chavance, P. [SPAWNING AREAS, LARVAL SURVEY AND ADULT BIOMASS OF THE SARDINE AND ANCHOVY FROM THE SOUTHERN GULF OF LEON (WESTERN MEDITERRANEAN).] Téthys 9(4):399-413. 1980. In French with English summ. SFA 30(3)
[Stn. Mar. d'Endoume, rue Batterie-des-Lions F-13007 Marseille, France]

85-002497 Claridge, P. N. and I. C. Potter. DISTRIBUTION, ABUNDANCE AND SIZE COMPOSITION OF MULLET POPULATIONS IN THE SEVERN ESTUARY AND BRISTOL CHANNEL. *J. Mar. Biol. Assoc. U.K.* 65(2):325-335. 1985. SFA 30(3)
[N.E.R.C. Inst. Mar. Environ. Res., Prospect Place, The Hoe, Plymouth PL1 3DH, England]

85-002498 Eck, G. W. and E. H. Brown, Jr. LAKE MICHIGAN'S CAPACITY TO SUPPORT LAKE TROUT *(SALVELINUS NAMAYCUSH)* AND OTHER SALMONINES: AN ESTIMATE BASED ON THE STATUS OF PREY POPULATIONS IN THE 1970s. *Can. J. Fish. Aquatic Sci.* 42(3):449-454. 1985. In English with French summ. SFA 30(3)
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85-002499 Freeman, B. J. and M. C. Freeman. PRODUCTION OF FISHES IN A SUBTROPICAL BLACKWATER ECOYSYSTEM: THE OKEFENOKEE SWAMP. *Limnol. Oceanogr.* 30(3):686-692. 1984. SFA 30(3)
[Inst. Ecol., Univ. Ga., Athens 30602]

85-002500 Gutreuter, S. J. and R. O. Anderson. IMPORTANCE OF BODY SIZE TO THE RECRUITMENT PROCESS IN LARGEMOUTH BASS POPULATIONS. *Trans. Am. Fish. Soc.* 114(3):317-327. 1985. SFA 30(3)
[Inland Fish. Br., Tex. Parks Wildl., 4200 Smith School Rd., Austin 78774]

85-002501 Hulon, M. W. and V. P. Williams. A PRELIMINARY EVALUATION OF BLUE TILAPIA POPULATION EXPANSION IN LAKE TOHOPEKALIGA, FLORIDA. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:264-271. 1982. SFA 30(3)
[Fla. Game Fresh Water Fish Comm., 207 W. Carroll St., Kissimmee 32741]

85-002502 Ishino, M.; K. Iwasaki; K. Otsuka and K. Kihara. DEMERSAL FISH COMMUNITY IN RELATION TO THE ABIOTIC ENVIRONMENTAL CONDITIONS IN THE WATERS OFF ARGENTINA. *J. Tokyo Univ. Fish.* 70(1-2):37-58. 1983. SFA 30(3)
[Lab. Fish. Oceanogr., Tokyo Univ. Fish. 5-7, Konan 4, Minato-ku, Tokyo 108, Japan]

85-002503 Kitahara, T. CHARACTERISTICS OF YEARLY FLUCTUATIONS IN THE SIZE OF TILE FISH POPULATION IN WAKASA BAY AND ITS MEAN GENERATION TIME. *Bull. Jpn. Soc. Sci. Fish.* 51(2):239-246. 1985. SFA 30(3)
[Dep. Fish., Kyoto Univ., Kyoto 606, Japan]

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85-002504 Kneib, R. T. EFFECTS OF SEMI-LUNAR SPAWNING ON THE POPULATION DYNAMICS OF THE KILLIFISH, *FUNDULUS HETEROCLITUS*. *Bull. Ecol. Soc. Am.* 66(2):210. 1985. Abstract only. SFA 30(3)
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85-002505 McGregor, A. J. ORIGINS OF SOCKEYE SALMON (*ONCORHYNCHUS NERKA* WALBAUM) IN THE TAKU-SNETTISHAM DRIFT GILLNET FISHERY OF 1983 BASED ON SCALE PATTERN ANALYSIS. *Alaska Dep. Fish Game Inf. Leaf.* No. 246. iii + 28p. 1985. SFA 30(3)
[Alaska Dep. Fish Game, Div. Commer. Fish., Juneau, AK]

85-002506 Palacios, J. A. and P. C. Phillips. [ANALYSIS OF THE POPULATION STRUCTURE OF *ANCHOA PANAMENSIS* (STEINDACHNER, 1875) IN THE GULF OF NICOYA, COSTA RICA. *Rev. Biol. Trop.* 32(1):77-84. 1984. In Spanish with English summ. SFA 30(3)
[Esc. Cienc. Biol., Area Biol. Mar., Univ. Nac., Heredia, Costa Rica] A relative-length frequency study in the Gulf of Nicoya, Costa Rica from May 1980 to April 1981, showed that in *Anchoa panamensis* there are two age groups per year, with maximum spawning peaks during the rainy season, May and October. The asymptotic total length (L_∞) and weight (W_∞) were 160.1 mm and 27.1 g, respectively. The total mortality rate was calculated as 5.240 and we conclude that the population is being underexploited.

85-002507 Pennington, M. ESTIMATING THE RELATIVE ABUNDANCE OF FISH FROM A SERIES OF TRAWL SURVEYS. *Biometrics* 41(1):197-202. 1985. SFA 30(3)
[NMFS, Woods Hole Lab., Woods Hole, MA 02543] A time series of fish abundance indices based on trawl surveys is highly contaminated by noise due to measurement error. A technique is described for the smoothing of the observed series that produces an abundance index which can have a variance considerably lower than the variance of the original index. The method is applied to haddock data from a series of groundfish trawl surveys conducted off the northeast coast of the United States.

85-002508 Piggins, D. J. and C. P. R. Mills. COMPARATIVE ASPECTS OF THE BIOLOGY OF NATURALLY PRODUCED AND HATCHERY-REARED ATLANTIC SALMON SMOLTS (*SALMO SALAR* L.). *Aquaculture* 45(1-4):321-333. 1985. SFA 30(3)
[Salmon Res. Trust Ireland, Inc., Farran Lab., Newport, Co. Mayo, Ireland]

85-002509 Sinclair, M.; V. C. Anthony; T. D. Iles and R. N. O'Boyle. STOCK ASSESSMENT PROBLEMS IN ATLANTIC HERRING *(CLUPEA HARENGUS)* IN THE NORTHWEST ATLANTIC. *Can. J. Fish. Aquatic Sci.* 42(5):888-898. 1985. In English with French summ. SFA 30(3)
[Halifax Fish. Res. Lab., Halifax NS B3J 2S7, Canada]

85-002510 Tonn, W. M. DENSITY COMPENSATION IN *UMBRA-PERCA* FISH ASSEMBLAGES OF NORTHERN WISCONSIN LAKES. *Ecology* 66(2):415-429. 1985. SFA 30(3)
[Dep. Zool., Univ. Alberta, Edmonton, AB T6G 2E9, Canada] Small, shallow seepage lakes in northern Wisconsin that have both low winter oxygen concentrations and low pH possess depauperate fish assemblages containing primarily or exclusively central mudminnows, *Umbra limi*, and yellow perch, *Perca flavescens*. Six times during three years I determined the total densities of fish in five lakes by mark-recapture and catch-per-effort methods. The richness of the fish assemblages in these lakes varied from one to three species in a nested pattern. While seasonal variations in density occurred within and among lakes due to variations of growth, mortality, and recruitment, total densities overall were independent of species richness. This pattern, called complete density compensation, suggests that total densities are expressions of the lakes' similar

POPULATION STUDIES, PRODUCTION, RECRUITMENT, ETC. (CONTINUED)

85-002510 CONTINUED abilities to support fish and that the species interact rather than being independent. An intense negative correlation between perch and mudminnow densities was found, suggesting a strong interspecific population dominance of perch over mudminnows. There was also indirect evidence that both competition (exploitation and interference) and predation by perch regulate mudminnow populations when the species co-occur. Because these assemblages were unpredictably variable in time and space, conclusions from single censuses would have been unreliable. An exercise simulating single seasonal censuses from each richness class showed that less than one-half of such single censuses would have produced the pattern of complete compensation that was observed in the field study. In general, my results support the idea that the relative importance of the factors that determine community structure, or even the factors themselves, can differ not only from assemblage to assemblage at any one time, but even from season to season or year to year within a single assemblage.

85-002511 Wooley, C. M. STOCK CONCEPT RELATED TO GULF COAST STATES STRIPED BASS MANAGEMENT. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:48-52. 1982. SFA 30(3)
[Off. Fish. Assist., U.S. FWS, 1612 June Ave., Panama City, FL 32405]

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC.

85-002512 Baerends, G. P. THE ORGANIZATION OF THE PRE-SPAWNING BEHAVIOUR IN THE CICHLID FISH *AEQUIDENS PORTALEGRENSIS* (HENSEL). *Neth. J. Zool.* 34(3):233-266. 1984. SFA 30(3)
[Zool. Lab., Univ. Groningen, Postbus 14, 9750 AA Haren, Netherlands]

85-002513 Burger, C. V.; R. L. Wilmot and D. B. Wangaard. COMPARISON OF SPAWNING AREAS AND TIMES FOR TWO RUNS OF CHINOOK SALMON *(ONCORHYNCHUS TSHAWYTSCHA)* IN THE KENAI RIVER, ALASKA. *Can. J. Fish. Aquatic Sci.* 42(4):693-700. 1985. In English with French summ. SFA 30(3)
[U.S. FWS, Natl. Fish. Res. Cent., 1011 East Tudor Rd., Anchorage, AK 99503]

85-002514 Chebanov, N. A. SELECTIVE CROSSING OF PINK SALMON *ONCORHYNCHUS GORBUSCHA* (WALBAUM). *Sov. J. Ecol. (Engl. Transl. Ekologiya)* 15(4):223-228. 1985. SFA 30(3)
[Kamchatka Sect., Pac. Res. Inst. Fish. Oceanogr., USSR] Systems of crossing determined by body length, time of arrival at spawning grounds and some ecological features of artificially selected pink salmon spawners in experimental groups were investigated. The groups differed in sex distribution, density of settlement, and the time periods involved prior to starting for the spawning grounds. It was found that in mate selection the males preferred the largest and most active females usually from among those who had arrived at the spawning grounds with them. There was a tendency toward positive selective crossing determined by the body length of the spawner. With the domination of males and high density there could be negative as well as positive selective crossing. The body weight of individuals was the major character determining the specificity of the system of their crossings as a whole.

85-002515 Daoulas, C. and M. Kattoulas. REPRODUCTIVE BIOLOGY OF *RUTILUS RUBILIO* (BONAPARTE, 1837) IN LAKE TRICHONIS. *Hydrobiologia* 124(1):49-55. 1985. SFA 30(3)
[Inst. Oceanogr. Fish. Res., GR-16604, Hellinikon, Athens, Greece]

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC. (CONTINUED)

85-002516 Davis, T. L. O. SEASONAL CHANGES IN GONAD MATURITY, AND ABUNDANCE OF LARVAE AND EARLY JUVENILES OF BARRAMUNDI, *LATES CALCARIFER* (BLOCH), IN VAN DIEMEN GULF AND THE GULF OF CARPENTARIA. *Aust. J. Mar. Freshwater Res.* 36(2):177-190. 1985. SFA 30(3)
[Div. Fish. Res., CSIRO Mar. Lab., G.P.O. Box 1538, Hobart, Tas. 7001, Australia] *L. calcarifer* undergoes a prolonged breeding season that starts just before the summer monsoon. In Van Diemen Gulf the fish spawned in 1978-1979 from September to February, and in the Gulf of Carpentaria in 1979-1980 from November to March. Spawning was localized, occurring near river mouths on coastal mudflats or upstream in rivers where salinities were relatively high (30). There was no evidence for coastal migrations to specific spawning grounds. Juveniles from 9 mm total length entered, on the high spring tides, supralittoral habitats such as tidal pools, gutters, swamps, and lowlying inundated coastal floodplain for use as nursery areas.

85-002517 Ferraris, C. J., Jr. REDESCRIPTION AND SPAWNING BEHAVIOR OF THE MURAENID EEL *GYMNOTHORAX HERREI*. *Copeia* 1985(2):518-520. 1985. SFA 30(3)
[Dep. Ichthyol., Am. Mus. Nat. Hist., New York, NY 10024]

85-002518 Gale, W. F. and W. G. Deutsch. FECUNDITY AND SPAWNING FREQUENCY OF CAPTIVE TESSELLATED DARTERS--FRACTIONAL SPAWNERS. *Trans. Am. Fish. Soc.* 114(2):220-229. 1985. SFA 30(3)
[Ichthyological Assoc., Inc., R.D. 1, Berwick, PA 18603]

85-002519 Golovan', G. A. and N. P. Pakhorukov. SOME NEW INFORMATION ON THE REPRODUCTION OF BATHYAL FISHES. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 24(5):113-120. 1984. SFA 30(3)
[Sevastopol' Exp.-Constr. Bur. Underwater Stud., Sevastopol', USSR]

85-002520 Lamarra, V. A.; M. C. Lamarra and J. G. Carter. ECOLOGICAL INVESTIGATIONS OF A SUSPECTED SPAWNING SITE OF COLORADO SQUAWFISH ON THE YAMPA RIVER, UTAH. *Great Basin Nat.* 45(1):127-140. 1985. SFA 30(3)
[Ecosystem Research Institute, 975 South State Highway, Logan, UT 84321] On 5 July 1981, 13 adult Colorado squawfish were found in spawning condition at river mile 16.5 in the Yampa River, a major tributary to the Green River. An investigation was undertaken to quantitatively describe the section of the river to gain insights on the spawning requirements of this endangered species. The substrate at the suspected spawning site was cobble with large interstitial spaces devoid of organics, silts, or clays. It appeared that larvae of several fish species utilized these cobble areas and the associated voids. Diurnal sampling indicated that larval drift occurred between 0100 and 0125 hours. Substrate size also appeared to be a dominant factor in fish distribution. Feeding intensities of these fish corresponded to macroinvertebrate drift.

85-002521 Potts, G. W. THE NEST STRUCTURE OF THE CORKWING WRASSE, *CRENILABRUS MELOPS* (LABRIDAE: TELEOSTEI). *J. Mar. Biol. Assoc. U.K.* 65(2):531-546. 1985. SFA 30(3)
[The Lab., Mar. Biol. Assoc., Citadell Hill, Plymouth PL1 2PB, England]

85-002522 Rimmer, M. A. REPRODUCTIVE CYCLE OF THE FORK-TAILED CATFISH *ARIUS GRAEFFEI* KNER & STEINDACHNER (PISCES: ARIIDAE) FROM THE CLARENCE RIVER, NEW SOUTH WALES. *Aust. J. Mar. Freshwater Res.* 36(1):23-32. 1985. SFA 30(3)
[Sch. Biol. Sci., Macquarie Univ., North Ryde, NSW 2113, Australia]

85-002523 Ross, S. W. REPRODUCTION OF THE BANDED DRUM, *LARIMUS FASCIATUS*, IN NORTH CAROLINA. *NOAA Fish. Bull.* 82(1):227-235. 1984. SFA 30(3)

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC. (CONTINUED)

85-002523 CONTINUED
[N.C. Div. Mar. Fish., P.O. Box 769, Morehead City, NC 28557] The reproductive biology of *Larimus fasciatus* was examined in coastal North Carolina from September 1975 through September 1976. Spawning occurred in nearshore waters from April through September with a peak in August. Maturity in females was reached by the first year between 120 and 130 mm SL. Generally the larger, older fish matured earlier and also continued spawning later in the season than the younger ones. Fecundity ranged from 12,750 to 320,819 ova with first spawners predicted to have between 31,088 and 65,038 eggs. Fecundity was best predicted by ovary weights during August. Sex ratios generally favored more females. As fish grew the sex ratio changed from predominately males to predominately females.

85-002524 Sinha, M. SEX RATIO, SIZE AT FIRST MATURITY AND FECUNDITY OF THE CANINE CATFISH-EEL, *PLOTOSUS CANIUS* HAMILTON. *Indian J. Anim. Sci.* 54(12):1151-1158. 1984. SFA 30(3)
[Cent. Inland Fish. Res. Cent., P.O.: Netaji Subhash Sanatorium, Dist. Nadia (W.B.) 741 251, India]

85-002525 Torricelli, P.; M. Lugli and G. Gandolfi. A QUANTITATIVE ANALYSIS OF THE FANNING ACTIVITY IN THE MALE *PADOGOBIUS MARTENSI* (PISCES: GOBIID'E). *Behaviour* 92(3-4):288-301. 1985. SFA 30(3)
[Inst. Zool., Univ. Parma, Parma, Italy]

85-002526 Villarreal, C. A. and J. E. Thorpe. GONADAL GROWTH AND BIMODALITY OF LENGTH FREQUENCY DISTRIBUTION IN JUVENILE ATLANTIC SALMON (*SALMO SALAR*). *Aquaculture* 45(1-4):265-288. 1985. SFA 30(3)
[Escuela Biol., Univ. Panama, Panama]

85-002527 Von Westernhagen, H. OBSERVATIONS ON THE REPRODUCTIVE AND LARVAL BIOLOGY OF *BLENNIUS PAVO* (PISCES: TELEOSTEI). *Helgol. Meeresunters.* 36(3):323-335. 1983. SFA 30(3)
[Biol. Anst. Helgol. (Zent.), Notkestr. 31, 2000 Hamburg 52, West Germany]

85-002528 Zhdankina, N. P.; S. A. Olifer and G. A. Solov'eva. STRUCTURE OF THE SPAWNING POPULATION, GROWTH AND FECUNDITY OF PELED, *COREGONUS PELED* (SALMONIDAE), FROM BRATSK RESERVOIR. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 24(5):121-124. 1984. SFA 30(3)
[VostSibRybNIIProekt, Ulan-Ude, USSR]

MOVEMENTS, SEASONAL AND DEPTH DISTRIBUTION, ETC.

85-002529 Coombs, S. H.; C. A. Fosh and M. A. Keen. THE BUOYANCY AND VERTICAL DISTRIBUTION OF EGGS OF SPRAT (*SPRATTUS SPRATTUS*) AND PILCHARD (*SARDINA PILCHARDUS*). *J. Mar. Biol. Assoc. U.K.* 65(2):461-474. 1985. SFA 30(3)
[Nat. Environ. Res. Counc., Inst. Mar. Environ. Res., Prospect Place, The Hoe, Plymouth PL1 3DH, England]

85-002530 Ewing, R. D.; C. E. Hart, C. A. Fustish and G. Concannon. EFFECTS OF SIZE AND TIME OF RELEASE ON SEAWARD MIGRATION OF SPRING CHINOOK SALMON, *ONCORHYNCHUS TSHAWYTSCHA*. *NOAA Fish. Bull.* 82(1):157-164. 1984. SFA 30(3)
[Corvallis Fish Res. Lab., Oreg. State Univ., Corvallis, OR 97331] Juvenile spring chinook salmon, *Oncorhynchus tshawytscha*, from Round Butte

MOVEMENTS, SEASONAL AND DEPTH DISTRIBUTION, ETC. (CONTINUED)

85-002530 CONTINUED Hatchery on the Deschutes River, Oregon, were released monthly into a 3.7 km fish ladder. Fish released into the ladder from February to May migrated through the ladder in mid-May in both 1977 and 1978. Fish released after mid-May migrated through the ladder within 2 weeks after release. The extent of migration decreased progressively in fish released after 15 June. The migration was presumably photoperiod dependent, although temperature may have acted both as a releasing factor for migration and as a stimulus for growth. In the fish ladder, size of the fish remained constant over a 3-week migration period, suggesting that larger fish migrated before smaller fish. After a migration of 213 km, fish captured at the Dalles Dam had very large apparent growth rates, suggesting that larger fish were faster migrants.

85-002531 Hansen, L. P. and B. Jonsson. DOWNSTREAM MIGRATION OF HATCHERY-REARED SMOLTS OF ATLANTIC SALMON (*SALMO SALAR* L.) IN THE RIVER IMSA, NORWAY. *Aquaculture* 45(1-4):237-248. 1985. SFA 30(3)
[Dir. Wildl. Freshwater Fish., Fish. Res. Div., Tungasletta 2, N-7000 Trondheim, Norway]

85-002532 Heinrich, J. W.; W. C. Anderson and S. D. Oja. MOVEMENT AND CAPTURE OF SEA LAMPREYS (*PETROMYZON MARINUS*) MARKED IN NORTHERN LAKE HURON, 1981-82. *Great Lakes Fish. Comm. Tech. Rep.* No. 42. p. 1-14. 1985. SFA 30(3)
[U.S. FWS, Marquette Biol. Stn., Marquette, MI 49855]

85-002533 Jonsson, B. and J. Ruud-Hansen. WATER TEMPERATURE AS THE PRIMARY INFLUENCE ON TIMING OF SEAWARD MIGRATIONS OF ATLANTIC SALMON *(SALMO SALAR)* SMOLTS. *Can. J. Fish. Aquatic Sci.* 42(3):593-595. 1985. In English with French summ. SFA 30(3)
[Dir. Wildl. Freshwater Fish., Res. Stn. Freshwater Fish., Ims, N-4300 Sandnes, Norway]

85-002534 Landesman, J. G. HORIZONTAL AND VERTICAL MOVEMENTS AND SEASONAL POPULATION SHIFTS IN THE BLUE SHARK, *PRIONACE GLAUCA*, NEAR SANTA CATALINA ISLAND, CALIFORNIA. *M.S. thesis, Calif. State Univ. (Long Beach)* 92p. 1984. From Masters Abstr. 23(1):105. 1985. SFA 30(3)
[Eighteen blue sharks were tracked by ultrasonic telemetry; fifteen moved generally either northwest torward the San Pedro Channel or south toward Catalina. Seasonally, the greatest directionality (straightness) occurred during summer, when all movement directions were in the northwest quadrant. Movements toward Catalina occurred between October and April, perhaps in response to changing prey availability. During day and dusk, relatively more time was spent in shallow (0-20m) and greatest (>170m) depths than in intermediate depths (21-70m). The reverse was true at night. Mean movement rates at night (1.7 km/h) were significantly greater than during the day (1.3 km/h). Deep dives interspersed with shallow surface intervals were most frequent during the day and dusk (one dive/3.2 and 2.0 h) while decreasing at night. Sex ratios varied from nearly all females (December to April) to nearly all males (June to October) to mixed sexes in November and May.

85-002535 Larson, R. J. and E. E. DeMartini. ABUNDANCE AND VERTICAL DISTRIBUTION OF FISHES IN A COBBLE-BOTTOM KELP FOREST OFF SAN ONOFRE, CALIFORNIA. *NOAA Fish. Bull.* 82(1):37-53. 1984. SFA 30(3)
[Dep. Biol. Sci., San Francisco State Univ., San Francisco, CA 94132]

85-002536 Loyenko, A. A. and A. G. Chernitskiy. FACTORS INFLUENCING DOWNSTREAM MIGRATION OF YOUNG ATLANTIC SALMON, *SALMO SALAR* (SALMONIDAE), RELEASED FROM HATCHERIES. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)*

MOVEMENTS, SEASONAL AND DEPTH DISTRIBUTION, ETC. (CONTINUED)

85-002536 CONTINUED 24(5):39-48. 1984. SFA (30)3
[PINRO, Murmansk, USSR]

85-002537 McMahon. T. E. THE ROLE OF EMIGRATION IN THE DYNAMICS AND REGULATION OF POPULATIONS OF THE DESERT PUPFISH (*CYPRINODON MACULARIUS*) *Ph.D. dissertation, Univ. Ariz.* 96p. 1984. From Diss. Abstr. Int. B Sci. Eng. 45(12):3745. 1985. SFA 30(3)

85-002538 Rottiers, D. V. and C. A. Lemm. MOVEMENT OF UNDERYEARLING WALLEYES IN RESPONSE TO ODOR AND VISUAL CUES. *Prog. Fish-Cult.* 47(1):34-41. 1985. SFA 30(3)
[U.S. FWS, R.D. #4, Box 63, Wellsboro, PA 16901]

85-002539 Shaw, R. F.; J. H. Cowan, Jr. and T. L. Tillman. DISTRIBUTION AND DENSITY OF *BREVOORTIA PATRONUS* (GULF MENHADEN) EGGS AND LARVAE IN THE CONTINENTAL SHELF WATERS OF WESTERN LOUISIANA. *Bull. Mar. Sci.* 36(1):96-103. 1985. SFA 30(3)
[Coastal Ecol. Fish. Inst., Cent. Wetland Resour., La. State Univ., Baton Rouge 70803-7503]

85-002540 Yeager, D. M. ULTRASONIC TELEMETRY OF STRIPED BASS X WHITE BASS HYBRIDS IN THE ESCAMBIA RIVER, FLORIDA. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:62-73. 1982. SFA 30(3)
[Fla. Game Freshwater Fish Comm., Rt. 1, Box 79F, Holt 32564] Biotelemetry studies of 13 striped bass (*Morone saxatilis*) x white bass (*M. chrysops*) hybrids in the Escambia River, Florida demonstrated positive affinity of the hybrids for saline waters. Average salinity at relocation sites ranged from 0.5 to 4.1 ppt at the surface and from 3.6 to 21.8 ppt on the bottom. Movements of hybrids in the river system appear to be strongly influenced by seasonal fluctuations in river discharge. Hybrids usually inhabited the lower, tidal delta of the river during periods of low and normal discharge and moved into the bay during times of high flow. No evidence of significant upstream emigration was observed. Two hybrids emigrated from the Escambia River estuary into adjacent river systems. Maximum movement recorded was 88 km.

FOODS/FEEDING

85-002541 Barefiled, R. L. COMPARISON OF THE FEEDING ABILITIES OF BLACK AND WHITE CRAPPIE UNDER DIFFERENT LEVELS OF TURBIDITY. *M.S. thesis, Univ. Ariz.* 26p. 1984. From Masters Abstr. 23(1):109. 1985. SFA 30(3)
[Many researchers have suggested, from empirical observations, that white crappie are more tolerant than black crappie of turbid conditions. From a comparison of the life histories of both species, it appears that if such a difference does exist, it is most likely related to feeding behavior. This study was designed to determine if one species is better able than the other to detect and ingest prey under conditions of high turbidity. There was no statistically significant difference between the abilities of the two species to ingest *Daphnia pulex* at turbidities as high as 80 and 160 Nepholometer Turbidity Units (NTU's). If turbidity does limit the distribution of black crappie, this limitation is very unlikely to be related to prey detection in turbid water.

85-002542 Blaustein, L. and R. Karban. EFFECTS OF MOSQUITOFISH (*GAMBUSIA AFFINIS*), GREEN SUNFISH (*LEPOMIS CYANELLUS*) AND THEIR INTERACTIONS OF RICE-FIELD FAUNA WITH PARTICULAR REFERENCE TO MOSQUITOES. *Bull. Ecol. Soc.*

FOODS/FEEDING (CONTINUED)

85-002542 CONTINUED *Am.* 66(2):143. 1985. Abstract only. SFA 30(3)
[Univ. Calif., Davis]

85-002543 Boehlert, G. W. and J. B. Morgan. TURBIDITY ENHANCES FEEDING ABILITIES OF LARVAL PACIFIC HERRING, *CLUPEA HARENGUS PALLASI*. *Hydrobiologia* 123(2):161-170. 1985. SFA 30(3)
[NMFS, P.O. Box 3830, Honolulu, HI 96812] Fishes inhabiting estuaries, rivers, and embayments are subject to turbid conditions. Larvae of many fishes utilize estuaries as nursery areas. For visual plankton feeders such as larval fishes, turbidity may reduce search and reaction distances, resulting in lowered feeding abilities. In this study feeding Pacific herring larvae, *Clupea harengus pallasi*, were exposed to suspensions of estuarine sediment and Mount Saint Helens volcanic ash at concentrations ranging from 0 mg $\cdot$ l^{-1} to 8000 mg $\cdot$ l^{-1}. In all experiments, maximum feeding incidence and intensity occurred at levels of suspension of either 500 mg $\cdot$ l^{-1} or 1000 mg $\cdot$ l^{-1} with values significantly greater than controls (0 mg $\cdot$ l^{-1}). Feeding decreased at greater concentrations. The suspensions may enhance feeding by providing visual contrast of prey items on the small perceptive scale used by the larvae Larval residence in turbid environments such as estuaries may serve to reduce predation from larger visual planktivores, while searching ability in the small larval perceptive field is not decreased.

85-002544 Boisclair, D. and W. C. Leggett. RATES OF FOOD EXPLOITATION BY LITTORAL FISHES IN A MESOTROPHIC NORTH-TEMPERATE LAKE. *Can. J. Fish. Aquatic Sci.* 42(3):556-566. 1985. In English with French summ. SFA 30(3)
[Dep. Biol., McGill Univ., 1205 Ave. Docteur Penfield, Montreal, PQ H3A 1B1, Canada]

85-002545 Bowman, R. E. FOOD OF SILVER HAKE, *MERLUCCIUS BILINEARIS*. *NOAA Fish. Bull.* 82(1):21-35. 1984. SFA 30(3)
[NMFS, Woods Hole, MA 02543]

85-002546 Cooner, R. W. and D. R. Bayne. DIET OVERLAP IN REDBREAST AND LONGEAR SUNFISHES FROM SMALL STREAMS OF EAST CENTRAL ALABAMA. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:106-114. 1982. SFA 30(3)
[Ala. Dep. Environ. Manage., Montgomery 36130]

85-002547 Cooper, S. D. MECHANISMS FOR THE EFFECTS OF TROUT ON STREAM POOL ASSEMBLAGES. *Bull. Ecol. Soc. Am.* 66(2):158. 1985. Abstract only. SFA 30(3)
[Univ. Calif., Santa Barbara] Trout reduce some southern California stream taxa (tadpoles, lestids, corixids, and notonectids), whereas other taxa (mayfly, psephenid, and some caddisfly larvae) increase with trout additions. I analyzed distributions, abundances, drift rates, emergence rates, and behavior of prey taxa in six stream pools lacking trout. After these measurements, trout were added to three pools and the other three acted as controls. Prey losses to emigration, emergence, and predation were assessed for the major prey taxa. Notonectids, lestids, and tadpoles moved to the edges of pools after trout were added and lestids and tadpoles hid in cracks and crevices. Drift of corixids and notonectids greatly increased after trout additions. The size of prey taken by trout decreased as trout eliminated large prey. Some taxa, such as the lestid naiads, were eliminated by trout predation, whereas other taxa, such as corixids, emigrated when trout were introduced.

FOODS/FEEDING (CONTINUED)

85-002548 Crowl, T. A. LARGEMOUTH BASS PREDATION ON CRAYFISH: A MODELING APPROACH. *Bull. Ecol. Soc. Am.* 66(2):150. 1985. Abstract only. SFA 30(3)
[Univ. Okla., Norman] A typical predator-prey interaction can be treated as four independent events: encounter, pursuit, capture, and ingestion. By assigning probabilities to these events, one can determine where prey selection occurs within the interaction. Experiments based on this model were designed to determine whether largemouth bass prey upon crayfish in a size-selective manner. Encounter rates were found to increase linearly with an increase in crayfish size. Both pursuit probabilities and capture efficiences decreased with an increase in crayfish size in a nonlinear fashion. The overall predation model, incorporating the above parameters, predicts that bass will prey more heavily on intermediate sized crayfish than on small ones, with large crayfish being relatively invulnerable to bass predation.

85-002549 Csányi, V. ETHOLOGICAL ANALYSIS OF PREDATOR AVOIDANCE BY THE PARADISE FISH (*MACROPODUS OPERCULARIS* L.). I. RECOGNITION AND LEARNING OF PREDATORS. *Behaviour* 92(3-4):227-240. 1985. SFA 30(3)
[Dep. Behav. Genet., L. Eötvös Univ. Budapest, Jávorka S. u. 14. Göd, H-2131 Hungary]

85-002550 Dimond, W. F. DEVICE TO INCREASE EFFICIENCY OF ACRYLIC TUBES FOR REMOVING STOMACH CONTENTS OF FISH. *N. Am. J. Fish. Manage.* 5(2A):214. 1985. SFA 30(3)
[Ill. Nat. Hist. Surv., Nat. Resour. Bldg., 607 E. Peabody Dr., Champaign, IL 61820]

85-002551 Domanevskaya M. V. and F. A. Patokina. FEEDING OF THE LARGE-EYED DOGTOOTH, *DENTEX MACROPHTHALMUS*, AND SPANISH BREAM, *PAGELLUS ACARNE* (SPARIDAE), FROM THE CENTRAL-EASTERN ATLANTIC OCEAN. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 24(5):107-112. 1984. SFA 30(3)
[AtlantNIRO, Kaliningrad, USSR]

85-002552 Eliassen, J. and M. Jobling. FOOD OF THE ROUGHHEAD GRENADIER, *MACROURUS BERGLAX*, LACEPEDE IN NORTH NORWEGIAN WATERS. *J. Fish Biol.* 26(2):367-376. 1985. SFA 30(3)
[Inst. Fiskerifag, Univ. Tromsø, 9001 Tromsø, Norway]

85-002553 Evans, B. I. and W. J. O'Brien. COMPARATIVE FEEDING ECOLOGY OF SALMONID AND CENTRARCHID PLANKTIVOROUS FISH. *Bull. Ecol. Soc. Am.* 66(2):170. 1985. Abstract only. SFA 30(3)
[Univ. Kans., Lawrence] We have observed, using videotape, the feeding behavior of four planktivorous fish species (bluegill, white crappie, arctic grayling, and lake cisco). Fish were observed while feeding on small (<1.5 mm) and large (>1.5 mm) zooplankton prey at several densities in a 225 l aquarium under low light (50-200 lx). Both salmonids searched for zooplankton prey in a near continuous fashion, whereas both centrarchids searched in a swim and pause fashion. When feeding on small zooplankton bluegill pursued prey from a hemispherically shaped volume. However, white, crappie pursued prey from within a more narrow, forward directed volume, with grayling intermediate to these extremes. When feeding on large zooplankton prey, all fish, except the cisco, pursued prey from a forward directed hemisphere. Search and pursuit speeds were much greater for all species when feeding on large prey than small prey. However, the effect was much less pronounced with white crappie.

FOODS/FEEDING (CONTINUED)

85-002554 Fernandes, G. de L. [THE DIET OF *GENYATREMUS LUTEUS* (BLOCK 1795) JORDAN & FESLER 1893 (TELEOSTEI, POMADASYIDAE).] *Bol. Lab. Hidrobiol.* 4(1):65-76. 1981-1982. In Portuguese with English summ. SFA 30(3)
[Lab. Hidrobiol., Univ. Fed. Maranhão, São Luís-Maranhão, Brazil]

85-002555 Fernandes, G. de L. [FOOD STUDIES OF CORVINA, *MACRODON ANCYLODON* (BLOCK & SCHNEIDER, 1801) - TELEOSTEI, SCIAENIDAE, FROM São Luís Island, Maranhão State.] *Bol. Lab. Hidrobiol.* 4(1):51-64. 1981-1982. In Portuguese with English summ. SFA 30(3)
[Lab. Hidrobiol., Univ. Fed. Maranhão, São Luís-Maranhão, Brazil]

85-002556 Fowler, J. F. and C. A. Taber. FOOD HABITS AND FEEDING PERIODICITY IN TWO SYMPATRIC STONEROLLERS (*CYPRINIDAE). Am. Midl. Nat.* 113(2):217-224. 1985. SFA 30(3)
[Biol. Dep., Southwest Mo. State Univ., Springfield 65804]

85-002557 Gaudin, P. [PREDATION BY SCULPIN (*COTTUS GOBIO* L.) IN BROWN TROUT FRY (*SALMO TRUTTA* L.): TOTAL LENGTH OF FRY CAPTURED BY SCULPINS.] *Hydrobiologia* 122(3) 267-270. 1985. In French with English summ. SFA 30(3)
[Lab. Eco-Ethol., Dep. Biol. Anim. Ecol., L.A.C.N.R.S. 367, Univ. Claude Bernard, Lyon I, 43, Bd du 11 Novembre 1918, F-69622 Villeurbanne Cedex, France]

85-002558 Germann, J. F. FOOD HABITS OF *MORONE* HYBRID BASS IN CLARKS HILL RESERVOIR, GEORGIA. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:53-61. 1982. SFA 30(3)
[Game Fish Div., Ga. Dep. Nat. Resour., Dearing 30808] Food habits of hybrid bass (*Morone saxatilis x Morone chrysops*) were studied in Clarks Hill Reservoir from 1 July 1980 to 30 June 1981. Stomachs from 820 hybrid bass ranging from 221 mm to 736 mm total length and 0.13 kg to 4.21 kg were examined. Overall, threadfin shad was the predominant food item of hybrid bass (62% frequency of occurrence). Data indicated hybrid bass were fully utilizing the threadfin shad. Hybrid bass did not shift to gizzard shad despite the apparent winter depletion of threadfin shad. Analysis by season and by size group indicated that insect larvae and non-shad fishes were of periodic importance and occurred in the diets levels higher than previously reported.

85-002559 Gunn, J. S. and N. E. Milward. THE FOOD, FEEDING HABITS AND FEEDING STRUCTURES OF THE WHITING SPECIES *SILLAGO SIHAMA* (FORSSKÅL) AND *SILLAGO ANALIS* WHITLEY FROM TOWNSVILLE, NORTH QUEENSLAND, AUSTRALIA. *J. Fish Biol.* 26(4):411-427. 1985. SFA 30(3)
[Div. Fish. Res., CSIRO Mar. Lab., G.P.O. Box 1538, Hobart, Tasmania 7001, Australia] The diet, feeding habits and feeding structures of 519 *Sillago sihama* and 493 *S. analis* specimens collected from beaches and estuaries in the Townsville region are described. The species are carnivores on a wide range of benthic, epibenthic and planktonic prey. Both undergo size related dietary shifts; *S. sihama* from predominantly planktonic crustaceans in fish of less than 80 mm T.L. to polychaetes, penaeid and brachyuran crustaceans and molluscs at larger sizes; *S. analis* from a mixture of small *Mesodesma eltanae* and amphipods at sizes of less than 80 mm T.L. to predominantly *M. eltanae* and small quantities of penaeids and brachyuran crabs in larger fish. The dietary shift was not associated with migration from a nursery area. While the species showed considerable overlap in the types of prey utilized, there were significant differences in the relative importance of shared componenets in their diets. The major

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85-002559 CONTINUED difference was in the relative importance of the bivalve mollusc, *M. eltanae*. This was the dominant food of *S. analis* but of secondary importance in *S. sihama*. Associated with this basic difference in diet was a specialization of the pharyngeal dentition in *S. analis* to molariform crushing plates and a reduction of the gill rakers to vestigal knobs. In *S. sihama*, the pharyngeal teeth are sharp and pointed and the gill rakers normal. The feeding activity of *S. analis*, but not *S. sihama*, is limited by the tidal cycle, a factor which may be a form of temporal partitioning.

85-002560 Hargreaves, N. B. and R. J. LeBrasseur. SPECIES SELECTIVE PREDATION ON JUVENILE PINK *(ONCORHYNCHUS GORBUSCHA)* AND CHUM SALMON *(O. KETA)* BY COHO SALMON *(O. KISUTCH)*. *Can. J. Fish. Aquatic Sci.* 42(4):659-668. 1985. In English with French summ. SFA 30(3)
[Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

85-002561 Harris, J. H. DIET OF THE AUSTRALIAN BASS, *MACQUARIA NOVEMACULEATA* (PERCIFORMES: PERCICHTHYIDAE), IN THE SYDNEY BASIN. *Aust. J. Mar. Freshwater Res.* 36(2):219-234. 1985. SFA 30(3)
[Div. Fish., P.O. Box K220, Haymarket, NSW 2000, Australia]

85-002562 Henderson, M. A. and T. G. Northcote. VISUAL PREY DETECTION AND FORAGING IN SYMPATRIC CUTTHROAT TROUT *(SALMO CLARKI CLARKI)* AND DOLLY VARDEN *(SALVELINUS MALMA)*. *Can. J. Fish. Aquatic Sci.* 42(4):785-790. 1985. In English with French summ. SFA 30(3)
[Dep. Fish. Oceans, Res. Br., 1090 W. Pender St., Vancouver, BC V6E 2P1, Canada]

85-002563 Hershey, A. E. and M. E. McDonald. DIET AND DIGESTION RATES OF SLIMY SCULPIN, *COTTUS COGNATUS*, IN AN ALASKAN ARCTIC LAKE. *Can. J. Fish. Aquatic Sci.* 42(3):483-487. 1985. In English with French summ. SFA 30(3)
[Dep. Zool., Birge Hall, Univ. Wis., Madison 53706]

85-002564 Hessen, D. O. SELECTIVE ZOOPLANKTON PREDATION BY PRE-ADULT ROACH *(RUTILUS RUTILUS)*: THE SIZE-SELECTIVE HYPOTHESIS VERSUS THE VISIBILITY-SELECTIVE HYPOTHESIS. *Hydrobiologia* 124(1):73-79. 1985. SFA 30(3)
[Dep. Biol., Div. Zool., Univ. Oslo, P.O. Box 1050, Blindern, 0316 Oslo-3, Norway]

85-002565 Hopkins, T. L. and R. C. Baird. FEEDING ECOLOGY OF FOUR HATCHETFISHES (STERNOPTYCHIDAE) IN THE EASTERN GULF OF MEXICO. *Bull. Mar. Sci.* 36(2):260-277. 1985. SFA 30(3)
[Dep. Mar. Sci., Univ. South Fla., St. Petersburg 33701]

85-002566 Karpenko, V. I. and L. V. Piskunova. IMPORTANCE OF MACROPLANKTON IN THE DIET OF YOUNG SALMONS OF GENUS *ONCORHYNCHUS* (SALMONIDAE) AND THEIR TROPHIC RELATIONSHIPS IN THE SOUTHWESTERN BERING SEA. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 24(5):98-106. 1984. SFA 30(3)
[KoTINRO, Petropavlovsk-Kamchatskiy, USSR]

85-002567 Keast, A. IMPLICATIONS OF CHEMOSENSORY FEEDING IN CATFISHES: AN ANALYSIS OF THE DIETS OF *ICTALURUS NEBULOSUS* AND *I. NATALIS*. *Can. J. Zool.* 63(3):590-602. 1985. In English with French summ. SFA 30(3)

FOODS/FEEDING (CONTINUED)

85-002567 CONTINUED
[Dep. Biol., Queen's Univ., Kingston, ON K7L 3N6, Canada] The implications of chemosensory feeding and associated ictalurid morphology were investigated through a seasonal study of the diets of the brown bullhead (*Ictalurus nebulosus*) and yellow bullhead (*I. natalis*) relative to food availability. Based on the attributes of chemosensory feeding (little discrimination between prey types) and bullhead morphology (poor sight, broad mouth), it was predicted that bullheads would be food generalists and opportunists, and that age-class diets would overlap. These predictions were generally supported for the brown bullhead. Some food types (amphipods) were harvested when most abundant; however, others (chironomid larvae) were consistently taken, and a few potential prey types were underutilized. The yellow bullhead, by contrast, was a food generalist only when young. Adults were specialized piscivores and crayfish feeders. The brown bullhead showed greater weight and length increases than co-occurring visually feeding centrarchids with diets of similar calorific values. Because of the similarity in calorific intake among species, a greater metabolic efficiency in brown bullheads was indicated. Other workers have shown that brown bullheads have lower standard and active metabolisms than some fish species.

85-002568 Kelso, W. E. and J. J. Ney. NOCTURNAL FORAGING BY ALEWIVES IN RESERVOIR COVES. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:125-134. 1982. SFA 30(3)
[Dep. Fish. Wildl. Sci., VPI&SU, Blacksburg, VA 24061]

85-002569 Konkle, B. R. and W. G. Sprules. SIZE-SELECTIVE PREDATION BY A POPULATION OF STUNTED LAKE TROUT (*SALVELINUS NAMAYCUSH*). *Bull. Ecol. Soc. Am.* 66(2):211. 1985. Abstract only. SFA 30(3)
[Univ. Toronto, Mississauga, ON, Canada] Examination of the food habits of a population of "stunted" lake trout in Louisa Lake, Ontario, suggests that these fish are well adapted as facultative planktivores and feed in accordance with predictions concerning the growth efficiency of fishes. Electivities based on comparisons of diet with available prey size distributions suggest selection for large cladocerans (>99% of zooplanters found in guts were *Daphnia* >0.9 mm body size), even though similar-sized copepods may be more abundant. The pattern of electivity was similar for each depth stratum examined. We suggest fish use all parts of the water column while foraging and are not restricted to deeper water as previously believed. The combination of thermal constraints on growth and the low abundance of large prey items may contribute to the "stunting" of this lake trout population.

85-002570 Litva, M. K. FOOD HABIT, NICHE BREADTH AND OVERLAP IN A CYPRINID COMMUNITY. *Bull. Ecol. Soc. Am.* 66(2):218-219. 1985. Abstract only. SFA 30(3)
[Univ. Toronto, Toronto, ON, Canada]

85-002571 Maceina, M. J. and J. V. Shireman. INFLUENCE OF DENSE HYDRILLA INFESTATION ON BLACK CRAPPIE GROWTH. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:394-402. 1982. SFA 30(3)
[Cent. Aquatic Weeds, Univ. Fla., Gainesville 32611]

85-002572 Main, K. L. PREDATOR AVOIDANCE IN SEAGRASS MEADOWS: AN EXAMINATION OF PREY BEHAVIOR AND CRYPTIC COLORATION. *Bull. Ecol. Soc. Am.* 66(2):224. 1985. Abstract only. SFA 30(3)
[Harbor Branch Inst., Ft. Pierce, FL]

85-002573 Marschall, E. A.; R. A. Stein and P. L. Chesson. BEHAVIOR OF BLUEGILL FORAGING FOR PATCHILY DISTRIBUTED PREY. *Bull. Ecol. Soc. Am.* 66(2):224. 1985. Abstract only. SFA 30(3)
[Ohio State Univ., Columbus]

FOODS/FEEDING (CONTINUED)

85-002574 Martin, D. and B. Dyni. HOW CAN SO MANY CORAL-FEEDING BUTTERFLY FISH COEXIST ON HERON REEF? *Retort (Idaho Acad. Sci.)* 22(1):8. 1984. SFA 30(3)
[Dep. Biol., Coll. Idaho, Caldwell]

85-002575 McMullen, D. M. STUDIES ON THE EFFECT OF TEMPERATURE AND FOOD DENSITY ON GROWTH AND SURVIVAL OF LARVAL *MENIDIA PENINSULAE* (PISCES: ATHERINIDAE). *M.S. thesis, Univ. West Fla.* 1984. From Masters Abstr. 23(1):105. 1985. SFA 30(3)
Day of hatch tidewater silversides, *Menidia peninsulae*, were stocked at 5 fish per liter in 3L of seawater at 30°/oo and raised for 16 days at 20°, 25° and 30°C. Food organisms (*Branchionus* sp. or *Artemia* sp. nauplii) were maintained at 500, 1000, 5000 or 10000 food organisms per liter. At 20°C, there was no difference in final fish size based on food densities. At 25°C, there was a trend of increased final body length as food density increased from 500 to 5000/L. At 30°C, there was an increase in final body length as food density increased from 1000 to 5000/L. There were no significant differences in survival among food densities in tests at 20°, 25° or 30°C. However, for a given temperature and food density, survival was significant in explaining variance in final body length between replicates. In the present study, optimal culture conditions were determined to be 5000 food organisms/L at 25° for *M. peninsulae*.

85-002576 Modde, T. and C. G. Scalet. LATITUDINAL GROWTH EFFECTS ON PREDATOR-PREY INTERACTIONS BETWEEN LARGEMOUTH BASS AND BLUEGILLS IN PONDS. *N. Am. J. Fish. Manage.* 5(2B):227-232. 1985. SFA 30(3)
[Dep. Wildl. Fish. Sci., S. Dak. State Univ., Brookings 57007]

85-002577 Morgan, S. G.; C. S. Manooch III; D. L. Mason and J. W. Goy. PELAGIC FISH PREDATION ON *CERATASPIS*, A RARE LARVAL GENUS OF OCEANIC PENAEOIDS. *Bull. Mar. Sci.* 36(2):249-259. 1985. SFA 30(3)
[Dep. Zool., Univ. Md., College Park 20742]

85-002578 Morris, P. A. FEEDING HABITS OF BLACKSMITH, *CHROMIS PUNCTIPINNIS*, ASSOCIATED WITH A THERMAL OUTFALL. *NOAA Fish. Bull.* 82(1):199-205. 1984. SFA 30(3)
[Vantuna Res. Group, Dep. Biol., Occidental Coll., Los Angeles, CA 90041] The availabilty and use of food by blacksmith, *Chromis punctipinnis*, were examined at a thermal outfall and a control site in King Harbor, California. Stomach analysis showed that blacksmith from the outfall area consumed a significantly greater amount of food, consisting of larger prey items, than control fish. Movements of water created by the outflow may provide dietary benefits by reducing zooplankton predator avoidance and by entraining and entrapping organisms not normally planktonic. This dietary enrichment may result in attraction of blacksmith to the King Harbor outfall.

85-002579 Nautiyal, P. and M. S. Lal. FOOD AND FEEDING HABITS OF FINGERLINGS AND JUVENILES OF MAHSEER (*TOR PUTITORA* HAM.) IN NAYAR RIVER. *J. Bombay Nat. Hist. Soc.* 81(3):642-647. 1984. SFA 30(3)
[Fish Biol. Res. Lab., Dep. Zool., Garhwal Univ., Srinagar, Garhwal-246 174, U.P., India]

85-002580 Neidig, C. L. FEEDING RATES OF THREADFIN SHAD, *DOROSOMA PETENENSE* (GÜNTHER), ON DIFFERENT SIZED ZOOPLANKTON. *M.S. thesis, Univ. Ariz.* 25p. 1984. From Masters Abstr. 23(1):110. 1985. SFA 30(3)
The introduction of threadfin shad into an aquatic community to enhance the growth of game species is a management technique that may create more problems than it solves. In laboratory experiments, feeding rates of

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85-002580 CONTINUED threadfin shad on *Daphnia pulex* were determined. A single threadfin shad was found to have the capability of consuming nearly 6000 *Daphnia pulex* of various sizes in a 24-hour period. As threadfin shad are extremely prolific reproducers and efficient planktivores they may reduce the population density of zooplankton at a rate that exceeds the reproductive capability of plankton. This exhaustion of zooplankton could have an adverse long-term effect on the growth of game species. Therefore, shad should only be stocked in lakes where there would be a high or complete winterkill or they should not be introduced at all.

85-002581 Northridge, S. P. WORLD REVIEW OF INTERACTIONS BETWEEN MARINE MAMMALS AND FISHERIES. *FAO Fish. Tech. Pap.* 251. vii+190p. 1984. SFA 30(3)
[Int. Inst. Environ. Div., London, England]

85-002582 Pierce, C. L. THE INFLUENCE OF BLUEGILLS ON LITTORAL MACROINVERTEBRATES: PATCH COLONIZATION AND PREDATOR AVOIDANCE. *Bull. Ecol. Soc. Am.* 66(2):248. 1985. Abstract only. SFA 30(3)
[Univ. Md., College Park] I studied the effect of adult bluegills on macroinvertebrate colonization of replicated experimental habitat patches over a four-month period. Treatments were: bluegills absent; present with access to benthos; or present but prevented from foraging on benthos. This design allowed me to distinguish between the effects of fish foraging on colonizers and behavioral avoidance of patches with fish. Two of ten macroinvertebrate groups were significantly affected by bluegills. Beetle larvae were reduced ~60% by foraging fish. Dragonfly larvae were reduced ~85%, and fish present within patches but restrained from foraging produced the same effect as did foraging fish, indicating dragonfly larvae apparently avoided patches where bluegills were present. Although not prominent in this system numerically (0.25% of colonizers), dragonfly larvae comprised 23% of the toal biomass of colonizing macroinvertebrates, suggesting that the observed predator-avoidance behavior may have considerable consequence for the distribution of standing crop biomass in littoral habitats.

85-002583 Ready, R. C.; E. L. Mills and J. L. Confer. A NEW ESTIMATOR OF, AND FACTORS INFLUENCING, THE SAMPLING VAIRANCE OF THE LINEAR INDEX OF FOOD SELECTION. *Trans. Am. Fish. Soc.* 114(2):258-266. 1985. SFA 30(3)
[Dep. Nat. Resour., Cornell Univ., Ithaca, NY 14853]

85-002584 Romand, R. FEEDING BIOLOGY OF *APLOCHEILICHTHYS NORMANI*, AHL, A SMALL CYPRINODONTIDAE FROM WEST AFRICA. *J. Fish Biol.* 26(4):399-410. 1985. SFA 30(3)
[Lab. Ecol., Dep. Biol. Anim., Fac. Sci., Univ. Dakar, Dakar-Fann, Senegal]

85-002585 Schwartz, D. P. and O. E. Maughan. THE FEEDING PREFERENCES OF *TILAPIA AUREA* (STEINDACHNER) FOR FIVE AQUATIC PLANTS. *Proc. Okla. Acad. Sci.* 64:14-16. 1984. SFA 30(3)
[Coop. State Res. Serv., Langston Univ., Langston, OK 73050] Excessive abundance of aquatic plants in ponds and lakes has detrimental effects on fish populations, sport fishing, and dissolved oxygen concentrations. A widely used method of controlling aquatic vegetation is through the use of exotic herbivorous fish, including *Tilapia* spp. (Family Cichlidae). The feeding preferences of the blue tilapia, *Tilapia aurea* (Steindachner), for five aquatic plants were tested in two replicated experiments. Individual tilapia (94-176 g) were placed in heated (25 C), aerated, 75-liter aquaria and offered randomly assigned individual plants in experiment A or 1 of 10 possible paired combinations in experiment B during a 48-hr feeding period. The blue tilapia preferred plants in the following order in both experiments ($p<0.05$): [1] *Najas guadalupensis* (Spreng.) *Magnus* and *Chara*

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85-002585 CONTINUED sp., [2] filamentous algae (predominantly *Cladophora* sp.), [3] *Potamogeton pectinatus* L., and [4] *P. nodosus* Poir. The data were in agreement with the results of a field study in which the blue tilapia was tested as a biological vegetation control agent. The blue tilapia may, therefore, offer potential for controlling certain species of nuisance aquatic macrophytes.

85-002586 Serns, S. L. and M. H. Hoff. FOOD HABITS OF ADULT YELLOW PERCH AND SMALLMOUTH BASS IN NEBISH LAKE, WISCONSIN - WITH SPECIAL REFERENCE TO ZOOPLANKTON DENSITY AND COMPOSITION. *Wis. Dep. Nat. Resour. Tech. Bull.* No. 149. 24p. 1984. SFA 30(3)

[Dep. Nat. Resour., P.O. Box 7921, Madison, WI 53707] This 5-year study was done to determine the ecological relationships and compatibility of yellow perch and smallmouth bass sharing a water body. The research objectives were: 1) to measure zooplankton density and composition and relate that to food habits of adult yellow perch; and 2) to examine the dietary overlap between adult yellow perch and smallmouth bass. Zooplankton was sampled from May-September throughout 1977-81, and stomachs from angler-caught adult yellow perch and smallmouth bass were collected during the same months and years. The mean density of cladocerans in Nebish lake was higher in spring and fall than in summer, and *Daphnia* sp. was the most abundant cladoceran in every month except July. The only other significant cladocerans were *Holopedium gibberum* (most abundant cladoceran in July) and *Diaphanosoma leuchtenbergianum*, both of which exhibited midsummer pulses. The mean density of copepods was highest in May and June, but their densities were considerably less than the density of cladocerans. Of the two major zooplankton taxa ingested - *Daphnia* sp. and *H. gibberum* - yellow perch generally selected the larger individuals. In terms of their food preferences, they favored *Leptodora kindtii* and *Eurycerus lamellatus*, both of which were present in very low densities in the samples, and *Daphnia* sp. Perch exhibited a slight negative selection for *H. gibberum* and a strong negative selection for *D. leuchtenbergianum* and copepods. Dipterans were the major food item of yellow perch during May-July, but cladocerans were most important during August and September. Amphipods were also important in May, but less so from June-September. The frequency of occurrence and importance of most aquatic insects was highest in May and June, and then declined from July-September. The consumption of fishes by adult yellow perch, although never very high, was greatest during July. For smallmouth bass, insects were the most frequent item in the stomachs collected in May and June, while decapods (*Orconectes propinguus*) were the most frequent item from July-September. However, yellow perch and unidentified fishes (most were probably yellow perch) comprised the highest percent volume of food in May, while decapods comprised the highest during June-September. Other than in 1978, when dipterans were most frequent, decapods comprised the highest frequencey, volume, and index of importance each year. Dietary overlap between adult yellow perch and smallmouth bass was apparent for ephemeropterans and odonates in June and July, hemipterans and megalopterans in September, and dipterans throughout May-September. However, because of the relatively small percent of the total volume that these taxa comprised in smallmouth bass stomachs, competition for food resources between adult yellow perch and smallmouth bass in Nebish Lake would not seem to be severe.

85-002587 Shapiro, J. FOOD AND INTESTINAL CONTENTS OF THE SILVER CARP, *HYPOPHTHALMICHTHYS MOLITRIX* (VAL), IN LAKE KINNERET BETWEEN 1982-1984. *Bamidgeh* 37(1):3-18. 1985. SFA 30(3)

[Kinneret Fish. Lab., Tiberias, Israel] The food and intestinal contents of silver carp, *Hypophthalmichtys molitrix* Val in Lake Kinneret were investigated from August 1982 to February 1984. The gut of large silver carp contained mainly *Peridinium cinctum fa westii* (up to maximum of about 92% of the total volume of the reconizable organisms). The gut contents of small silver carp indicated more omnivorous feeding, for besides *P. cinctum*, they included large quantities of zooplankton, mainly *Mesocyclops leuckarti* and *Bosmina longirostris*.

FOODS/FEEDING (CONTINUED)

85-002588 Tilseth, S. and B. Ellertsen. THE DETECTION AND DISTRIBUTION OF LARVAL ARCTO-NORWEGIAN COD, *GADUS MORHUA*, FOOD ORGANISMS BY AN IN SITU PARTICLE COUNTER. *NOAA Fish. Bull.* 82(1):141-156. 1984. SFA 30(3)
[Inst. Mar. Res., Dir. Fish., 5011 Bergen-Nordnes, Norway] An in situ particle counter system was developed to count measure food particles in numbers per liter within the size range 150-600 µm, the sizes of copepod nauplii captured by first feeding cod larvae. Patches of particles/nauplii of 50-100 per liter were found in the spawning and larval first feeding area. Different sizes of copepod nauplii showed diel vertical migration, and this influenced the formation of patches. Mixing of the water column by wind forces created a homogeneous vertical distribution of particles. Gut content analysis of cod larvae during these hydrographical conditions indicated reduced accessibility of food organisms to larvae.

85-002589 Tkanchenko, V. A. and G. K. Parchuk. FEEDING OF YOUNG-OF-THE-YEAR COMMERCIAL FISHES IN SASYKSKII RESERVOIR AND KILISKAYA DELTA OF THE DANUBE. *Hydrobiol. J. (Engl. Transl. Gidrobiol. Zh)* 20(6):7-11. 1984. SFA 30(3)
[Inst. Hydrobiol., AN USSR, Kiev, USSR]

85-002590 Uotani, I. [THE RELATION BETWEEN THE DEVELOPMENT OF FEEDING ORGANS AND FEEDING MODES OF THE ANCHOVY.] *Bull. Jpn. Soc. Sci. Fish.* 51(2):197-204. 1985. In Japanese with English summ. SFA 30(3)
[Fac. Mar. Sci. Technol., Tokai Univ., Shimizu 424, Japan]

85-002591 Vetchanin, V. I. FEEDING OF THE ASTRAKHAN SHAD, *ALOSA BRASHNIKOVI* (CLUPEIDAE), IN THE SOUTHEASTERN CASPIAN SEA. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 24(5):143-147. 1984. SFA 30(3)
[Turkman Sect., KaspNIRKh, Krasnovodsk, USSR]

85-002592 Wurtsbaugh, W. and H. Li. DIEL MIGRATIONS OF A ZOOPLANKTIVOROUS FISH (*MENIDIA BERYLLINA*) IN RELATION TO THE DISTRIBUTION OF ITS PREY IN A LARGE EUTROPHIC LAKE. *Limnol. Oceanogr.* 30(3):565-576. 1985. SFA (30)3
[Dep. Fish Wildl. (UMC 52), Utah State Univ., Logan 84322] Diel changes in the distribution of the tidewater silverside (*Menidia beryllina*) and its prey were measured in Clear Lake, California, a large, shallow, eutrophic lake. Zooplankton prey densities were low in the littoral zone, but increased rapidly to near peak abundances 50-200 m from shore. Gill netting, trawling, and visual observations showed that tidewater silversides migrated both horizontally and vertically to feed in areas of high zooplankton abundance. At night the fish concentrated near shore and did not feed. At dawn (8×10^8-2×10^{10} photons cm^{-2} nm^{-1} s^{-1}) the fish migrated lakeward at least 50-1,000 m, and littoral abundance decreased from more than 100 m^{-2} to only 0.1 m^{-2}. The migration preceded the initiation of feeding by 30-60 min. After feeding 2-4 h, the fish returned to the littoral zone and swam rapidly (6-11 body length s^{-1}) parallel to shore in narrow, continuous schools until resting aggregations formed. The fish returned to shore before they were satiated, perhaps to balance predation losses in offshore areas against foraging gains. A second period of offshore activity and feeding occurred in the afternoon and evening.

AGE AND GROWTH

85-002593 Adams, S. M. and R. B. McLean. ESTIMATION OF LARGEMOUTH BASS, *MICROPTERUS SALMOIDES* LACÉPÈDE, GROWTH USING THE LIVER SOMATIC INDEX AND PHYSIOLOGICAL VARIABLES. *J. Fish Biol.* 26(2):111-126. 1985. SFA 30(3)
[Environ. Sci. Div., Oak Ridge Natl. Lab., Oak Ridge, TN 37831] Stepwise regression models utilizing five easily-measured condition indices, two

AGE AND GROWTH (CONTINUED)

85-002593 CONTINUED physiological variables and two environmental variables were developed for estimating the monthly growth of age-I and II largemouth bass sampled during 1980 and 1982. The liver-somatic index (LSI) and standard metabolism at surface and thermocline temperatures were the most significant variables for estimating growth. Determination of monthly growth using the LSI requires 50% fewer samples than the usual method of follwoing changes in monthly mean weight. Because the LSI responds relatively rapidly to levels of energy intake and temperature, this index can be used to signal possible adverse effects on fish before changes in growth can be observed. This approach could be a useful management tool because, once validated for a particular aquatic system, frequent cost-effective growth estimates could be used to identify the presence of ecological perturbations and to quantify their effect.

85-002594 Allen, K. R. COMPARISON OF THE GROWTH RATE OF BROWN TROUT *(SALMO TRUTTA)* IN A NEW ZEALAND STREAM WITH EXPERIMENTAL FISH IN BRITAIN. *J. Anim. Ecol.* 54(2):487-495. 1985. SFA 30(3)

[192 Ewos Parade, Cronulla, N.S.W., Australia 2230] Comparison of the growth rate of brown trout, *Salmo trutta* L., fed to satiation under experimental conditions in Britain with that of fish at the same size and temperature under natural conditions in a fast-growing population in the Horokiwi Stream in New Zealand showed that, although there was good general agreement, there were two important differences. At temperatures below 13°C, trout in some parts of the Horokiwi grew more rapidly than experimental fish of the same size at the same temperature. Between 13°C and 19.5°C, growth in the Horokiwi was again more rapid than that of experimental fish, but appeared to decline with rising temperature. It was not possible to determine the temperature at which Horokiwi fish ceased to grow but it seemed likely to be above 19.5°C, the limit for the experimental fish. It is possible that there has been genetic selection for more rapid growth and a higher temperature limit in the Horokiwi trout; the population is derived from a very small initial liberation in 1885 and the temperature range is slightly above that in British streams. An alternative explanation for the more rapid growth by the Horokiwi fish is that the experimental conditions did not allow the fish to achieve the maximum growth rate of which they were intrinsically capable, even though they were fed to satiety.

85-002595 Bronte, C. R. and D. W. Johnson. GROWTH OF PADDLEFISH IN TWO MAINSTREAM RESERVOIRS WITH REFERENCE TO COMMERCIAL HARVEST. *Trans. Ky. Acad. Sci.* 46(1-2):28-32. 1985. SFA 30(3)

[Red Cliff Fish. Dep., Red Cliff Band Lake Superior Chippewas, P.O. Box 529, Bayfield, WI 54814]

85-002596 Brooks, M. J.; R. O. Smitherman; J. A. Chappell; J. C. Williams and R. A. Dunham. LENGTH VARIATION IN SPECIES AND HYBRID POPULATIONS OF BLUE, CHANNEL, AND WHITE CATFISHES. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:190-195. 1982. SFA 30(3)

[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36849]

85-002597 Byrce, T. D. and W. L. Shelton. DIMORPHIC GROWTH PATTERNS ON SCALES OF STRIPED BASS AND *MORONE* HYBRIDS FROM A CENTRAL ALABAMA RIVER. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:42-47. 1982. SFA 30(3)

[Fish Wildl. Sect., DEH, Fort Stewart, GA 31314] Striped bass (*Morone saxatilis*) and *Morone* hybrids were studied in the Tallapoosa River downstream of Thurlow Dam from March through November 1980. Age and growth analysis revealed that over 80% of the striped bass scales had numerous false annuli, while none were observed on *Morone* hybrid scales. The presence of false annuli indicated interruptions in normal growth during the mid- to late-summer period. These interruptions were attributed to striped bass preferential selection of cooler water temperatures in mid-summer. The

AGE AND GROWTH (CONTINUED)

85-002597 CONTINUED striped bass are believed to spatially separate themselves from much of their food, resulting in a reduced growth rate until water temperatures subside in the fall.

85-002598 Casey, J. G.; H. L. Pratt, Jr. and C. E. Stillwell. AGE AND GROWTH OF THE SANDBAR SHARK *(CARCHARHINUS PLUMBEUS)* FROM THE WESTERN NORTH ATLANTIC. *Can. J. Fish. Aquatic Sci.* 42(5):963-975. 1985. In English with French summ. SFA 30(3)
[NMFS, Narragansett Lab., Narragansett, RI 02882]

85-002599 Costa, M. de L. and I. da A. G. M. Juras. [AGE AND GROWTH DETERMINATION OF BANDEIRADO, *BAGRE BAGRE* (LINNAEUS, 1766).] *Bol. Lab. Hidrobiol.* 4(1):17-50. 1981-1982. In Portuguese with English summ. SFA 30(3)
[Lab. Hidrobiol., Univ. Fed. Maranhão, São Luís-Maranhão, Brazil]

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[NMFS, 3150 Paradise Dr., Tiburon, CA 94920]

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[All Union Res. Inst. Sea Fish. Oceanogr., VNIRO, Moscow, USSR]

85-002603 Harris, J. H. AGE OF AUSTRALIAN BASS, *MACQUARIA NOVEMACULEATA* (PERCIFORMES: PERCICHTHYIDAE), IN THE SYDNEY BASIN. *Aust. J. Mar. Freshwater Res.* 36(2):235-246. 1985. SFA 30(3)
[Div. Fish. P.O. Box K220, Haymarket, NSW 2000, Australia]

85-002604 Hilge, V. THE INFLUENCE OF TEMPERATURE ON THE GROWTH OF THE EUROPEAN CATFISH (*SILURUS GLANIS* L.). *J. Appl. Ichthyol.* 1(1):27-31. 1985. In English with German and French summ. SFA 30(3)
[Bundesforsch. Fisch., Inst. Kusten- Binnenfisch., Aussenstelle Ahrenburg, Wulfsdorfer Weg 204, D-2070 Ahrensburg, West Germany]

85-002605 Hoyer, M. V.; J. V. Shireman and M. J. Maceina. USE OF OTOLITHS TO DETERMINE AGE AND GROWTH OF LARGEMOUTH BASS IN FLORIDA. *Trans. Am. Fish. Soc.* 114(2):307-309. 1985. SFA 30(3)
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85-002606 Keast, A. and J. M. Eadie. GROWTH DEPENSATION IN YEAR-0 LARGEMOUTH BASS: THE INFLUENCE OF DIET. *Trans. Am. Fish. Soc.* 114(2):204-213. 1985. SFA 30(3)
[Dep. Biol., Queen's Univ., Kingston, ON K7L 3N6, Canada]

AGE AND GROWTH (CONTINUED)

85-002607 Kishida, T.; K. Ueda and K. Takao. [AGE AND GROWTH OF JAPANESE SPANISH MACKEREL IN THE CENTRAL AND WESTERN WATERS OF THE SETO INLAND SEA.] *Bull. Jpn. Soc. Sci. Fish.* 51(4):529-537. 1985. In Japanese with English summ. SFA 30(3)
[Nansei Reg. Fish. Res. Lab., Ohno, Saeki, Hiroshima 739-04, Japan]

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[Dep. Physiol., Univ. Iceland, Grensasvegur 12, Reykjavik, Iceland]

85-002609 McGurk, M. D. RING DEPOSITION IN THE OTOLITHS OF LARVAL PACIFIC HERRING, *CLUPEA HARENGUS PALLASI*. *NOAA Fish. Bull.* 82(1):113-120. 1984. SFA 30(3)
[Inst. Anim. Resour. Ecol., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada] The first normal ring in the sagittae of Pacific herring, *Clupea harengus pallasi*, larvae is deposited at the age of complete yolk absorption. The rates of deposition of subsequent rings in four groups of larvae that were fed daily ranged from 0.12 to 0.96 rings per day, and only two of the four groups had a daily pattern. Larvae that were starved from hatch deposited one normal ring on day 6 posthatch, but all ring deposition stopped thereafter. The starvation of subgroups of larvae after 7 days of feeding and after 25 days of feeding produced deposition rates that were not significantly different from those of the parent feeding groups. The average rates of normal ring deposition were positively correlated with the average rates of growth in length. Daily ring deposition in herring larvae <20 mm long occurs in populations with an average growth rate equal to or higher than 0.36 mm per day.

85-002610 Neilson, J. D.; G. H. Geen and D. Bottom. ESTUARINE GROWTH OF JUVENILE CHINOOK SALMON *(ONCORHYNCHUS TSHAWTSCHA)* AS INFERRED FROM OTOLITH MICROSTRUCTURE. *Can. J. Fish. Aquatic Sci.* 42(5):899-908. 1985. In English with French summ. SFA 30(3)
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[NMFS, Miami Lab., 75 Virginia Beach Dr., Miami, FL 33149-1099]

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85-002613 Schramm, H. L., Jr. and J. F. Doerzbacher. USE OF OTOLITHS TO AGE BLACK CRAPPIE FROM FLORIDA. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:95-105. 1982. SFA 30(3)
[Sch. For. Resour. Conserv., Univ. Fla., Gainesville 32611] The scale method and length-frequency analysis were not adequate for accurately aging and measuring growth rate of black crappie (*Poxomis nigromaculatus*) collected in Florida. Black crappie otoliths (sagittae) showed clearly recognizable bands in whole view, suggesting possible use of otoliths to age black crappie. Otoliths satisfied necessary criteria for validating

AGE AND GROWTH (CONTINUED)

85-002613 CONTINUED aging structures: growth was proportional to black crappie growth, annuli formed in the spring, and back-calculated lengths agreed with lengths for age-classes estimated from length-frequency analysis. We consider otoliths useful for accurately aging black crappie in Florida.

85-002614 Tucker, W. H. AGE AND GROWTH OF LARGEMOUTH BASS IN THE MOBILE DELTA. *J. Ala. Acad. Sci.* 56(2):65-70. 1985. SFA 30(3)
[Ala. Dep. Conserv. Nat. Resour., Fairhope, 36533]

85-002615 Vinberg, G. G. SOME ESSENTIAL CLARIFICATIONS OF METHODS FOR THE STUDY OF ANIMAL GROWTH. *Hydrobiol. J. (Engl. Transl. Gidrobiol. Zh.)* 20(6):46-53. 1984. SFA 30(3)
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[Mar. Ecol. Consult. South Calif., 531 Encinitas Blvd., Suite 110, Encinitas, CA 92024]

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[Div. Fish. Res., CSIRO Mar. Lab., G.P.O. Box 1538, Hobart, Tasmania 7001, Australia]

85-002620 Chernova, N. V. A NEW RECORD OF THE ATLANTIC BLENNY, *CHIROLOPHIS ASCANII* (STICHAEIDAE) FROM THE COAST OF MURMAN. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 24(5):137-138. 1984. SFA 30(3)
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[Dep. Fish. Oceans, West Vancouver Lab., Vancouver, BC V7V 1N6, Canada]

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85-002637 Pigg, J.; W. Harrison and R. Gibbs. RED RIVER PUPFISH, *CYPRINODON RUBROFLUVIATILIS* (FOWLER), IN THE ARKANSAS RIVER DRAINAGE IN WESTERN OKLAHOMA. *Proc. Okla. Acad. Sci.* 64:48. 1984. SFA 30(3)
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85-002638 Sinclair, M. and T. D. Iles. ATLANTIC HERRING *(CLUPEA HARENGUS)* DISTRIBUTIONS IN THE GULF OF MAINE-SCOTIAN SHELF AREA IN RELATION TO OCEANOGRAPHIC FEATURES. *Can. J. Fish. Aquatic Sci.* 42(5):880-887. 1985. In English with French summ. SFA 30(3)
[Halifax Fish. Res. Lab., Halifax NS B3J 2S7, Canada]

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85-002640 Stephens, D. E. and K. W. Prather. THE LONGNOSE DACE, *RHINICHTHYS CATARACTAE* (VALENCIENNES), IN KENTUCKY. *Trans. Ky. Acad. Sci.* 46(1-2):56. 1985. SFA 30(3)
[Ky. Dep. Fish Wildl. Resour., #1 Game Farm Rd., Frankfort, KY 40601]

85-002641 Twomey, E. and P. Byrne. A NEW RECORD FOR THE TARPON, *TARPON ATLANTICUS* VALENCIENNES (OSTEICHTHYES-ELOPIFORMES-ELOPIDAE), IN THE EASTERN NORTH ATLANTIC. *J. Fish Biol.* 26(2):359-362. 1985. SFA 30(3)
[Dep. Zool., Univ. Coll. Cork, Lee Maltings, Prospect Row, Cork, Ireland]

85-002642 Wheeler, A. A RECORD OF THE WHITE MARLIN, *TETRAPTURUS ALBIDUS* (ISTIOPHORIDAE: PERCIFORMES: OSTEICHTHYES) FROM THE BRITISH COAST. *J. Mar. Biol. Assoc. U.K.* 65(2):305-310. 1985. SFA 30(3)
[Dep. Zool., Br. Mus. (Nat. Hist.), Cromwell Rd., London SW7 5BD, England]

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85-002643 Bishara, N. F. THE PROBLEM OF SARDINE FISHERIES IN EGYPT. *Arch. Hydrobiol.* 103(2):257-265. 1985. SFA 30(3)
[Inst. Oceanogr. Fish., Kayet Bey, Alexandria, Egypt] During the last twenty years, a drastic decline in the sardine landings along the Egyptian Mediterranean coast were observed. Several factors are responsible for this decline. 1) The construction of the high dam at Aswan in 1964. - 2)Increased water pollution, either by sewage or industrial wastes as a result of increasing industrialization of the area.

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85-002644 Henderson, B. A. FACTORS AFFECTING GROWTH AND RECRUITMENT OF YELLOW PERCH, *PERCA FLAVESCENS* MITCHILL, IN SOUTH BAY, LAKE HURON. *J. Fish Biol.* 26(4):449-458. 1985. SFA 30(3)

[Lake Huron Fish. Res. Unit, Ontario Minist. Nat. Resour., R.R. #1, Tehkummah, ON POP 2C0, Canada]

85-002645 Hines, A. H. ESTUARINE INVERTEBRATES AND FISH: SAMPLING DESIGN AND CONSTRAINTS FOR LONG-TERM MEASUREMENTS OF POPULATION DYNAMICS. *Bull. Ecol. Soc. Am.* 66(2):194. 1985. Abstract only. SFA 30(3)

[Smithsonian Environ. Res. Cent., Edgewater, MD] The beginnings of a long-term data set are presented for invertebrates and fish species representing an array of physical tolerances, trophic levels, and life history strategies in a subestuary of central Chesapeake Bay. Six years' detailed data on their population abundances are compared to 16 years of salinity, water temperature, and meteorological records. The 6 years spanned a 3-year period of drought, which resulted in markedly increased salinity and reflected a greater change than reduced salinities during hurricane and tropical storms. Although some low salinity species declined and some marine species increased during the drought, most species showed no obvious response to elevated salinities. All species were characterized by enormous short-term variability in population abundance, which appeared comparable to the variability in the long-term catch statistics for Chesapeake Bay fisheries. This inherent variability requires decades of data in order to detect changes in population levels of most estuarine species. The only economically practical way to collect the necessary population data on noncommercial, but ecologically important, species is to utilize simple sampling devices which can be operated consistently at the same time and stations year after year by small numbers of people at established research institutions.

85-002646 Jackson, D. C.; R. V. Kilambi and P. J. Polechla, Jr. THE IMPACT OF DROUGHT ON LAKE ELMDALE LARGEMOUTH BASS. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:272-279. 1982. SFA 30(3)

[Dep. Fish. Allied Aquacult., Auburn Univ., AL 36849] Low water levels, sustained high temperatures, and potential increases in predatory pressure appear to have adversely affected the largemouth bass *(Micropterus salmoides)* population of Lake Elmdale, Arkansas. An estimated population of 3,916 bass were present in 1981 compared to previous estimates of 11,770 in 1977 and 8,937 in 1979. Size overlap between 2- and 3-year-old bass is indicative of differential states of sexual maturity and associated reproductive activity during the harsh drought conditions.

85-002647 Konopacky, R. C. SEDIMENTATION AND PRODUCTIVITY IN SALMONID STREAMS. *Ph. D. dissertation, Univ. Idaho* 214p. 1984. From Diss. Abstr. Int. B Sci. Eng. 45(11):3415. 1985. SFA 30(3)

In laboratory stream channels, juvenile steelhead trout, *Salmo gairdneri*, and chinook salmon, *Oncorhynchus tshawytscha*, fed a high ration (6% fish weight/day) in seven equal meals had significantly higher production, growth, and standing crop (both numbers and biomass) than fish fed low rations (1.5% fish weight/day, seven equal meals). Difference in production, growth, and standing crop between groups fed 6% rations in seven equal meals or with largest meals at dawn and dusk and smallest meal at noon were non-significant and non-conclusive. Numbers of benthic and drifting invertebrates were more abundant in laboratory stream channels with sand-pebble substrates than in those with coarse gravel substrates. Biomass of benthic or drifting invertebrates collected did not differ between substrates. Significantly more chironmids and ephemeropterans were collected from the sand-pebble substrate than from coarse gravel substrate. Production, density, and diet of underyearling chinook salmon and steelhead trout and invertebrate drift were assessed in laboratory streams having seived sand-pebble or coarse gravel riffles. Larger numbers and biomass of drifting invertebrates were collected in streams with sand-pebble riffles than in streams with gravel riffles. Chironomids were the most abundant

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85-002647 CONTINUED drift organism. Riffle substrate had no effect on production, growth, or density of steelhead trout. During an autumn test, most chinook salmon lost weight in channels with sand-pebble or gravel riffles but migrated only from channels with sand-pebble riffles. In natural streams, pool area and number of drifting invertebrates at dusk accounted for 73% of the variation in number of underyearling chinook salmon in pools. Riffle area, mean particle size of a riffle, and pool area accounted for 82% of variation in biomass of underyearling chinook salmon in pools. Fine sediments in riffles influenced invertebrate drift composition which, subsequently, influenced fish diet. Feeding activity of fish and stream size influenced habitat selection by underyearling salmon more than levels of fine sediment in riffles. Cold water temperatures, a lack of suitable substrate cover, and possibly food size rather than food item density caused underyearling salmon to migrate downstream early in the fall in one study area.

85-002648 Lacroix, G. L.; D. J. Gordon and D. J. Johnston. EFFECTS OF LOW ENVIRONMENTAL pH ON THE SURVIVAL, GROWTH, AND IONIC COMPOSITION OF POSTEMERGENT ATLANTIC SALMON *(SALMO SALAR). Can. J. Fish. Aquatic Sci.* 42(4):768-775. 1985. In English with French summ. SFA 30(3)
[Biol. Stn., St. Andrews, NB E0G 2X0, Canada]

85-002649 Larsson, P. PREDATION ON MIGRATING SMOLT AS A REGULATING FACTOR IN BALTIC SALMON, *SALMO SALAR* L., POPULATIONS. *J. Fish Biol.* 26(4):391-397. 1985. SFA 30(3)
[Swedish Salmon Res. Inst., Älvkarleby, Sweden] The results of three investigations, two with wild smolt and one with hatchery-reared smolt of Baltic salmon, were analysed with regard to mortality due to predation during river and estuarine migration. This mortality was found to be high, at least 50% of the initial number of smolt was estimated not to reach marine waters. Smolt mortality may be important in population regulation, analoguous to other animal species having the same life strategy with two life stages and a transfer to a new habitat connected to the shift in life stage.

85-002650 Malhotra, Y. R. and S. Munshi. FIRST FEEDING AND SURVIVAL OF *ASPIDOPARIA MORAR* LARVAE (CYPRINIDAE). *Trans. Am. Fish. Soc.* 114(2):286-290. 1985. SFA 30(3)
[Dep. Biosci., Univ. Jammu, Jammu-18001, India]

85-002651 Murphy, M. L. DIE-OFFS OF PRE-SPAWN ADULT PINK SALMON AND CHUM SALMON IN SOUTHEASTERN ALASKA. *N. Am. J. Fish. Manage.* 5(2B):302-308. 1985. SFA 30(3)
[NMFS, P.O. Box 210155, Auke Bay, AK 99821]

85-002652 Neitzel, D. A. and C. D. Becker. TOLERANCE OF EGGS, EMBRYOS, AND ALEVINS OF CHINOOK SALMON TO TEMPERATURE CHANGES AND REDUCED HUMIDITY IN DEWATERED REDDS. *Trans. Am. Fish. Soc.* 114(2):267-273. 1985. SFA 30(3)
[Environ. Sci. Dep., Pac. Northwest Lab., Richland, WA 99352]

85-002653 Platts, W. S. PROTECTION AND ENHANCEMENT OF PACIFIC SALMONIDS ON RANGES GRAZED BY LIVESTOCK: AN OVERVIEW. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 62-65. 1981. Available @ $7.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[U.S. For. Serv., Intermountain For. Range Exp. Stn., Boise, ID 83706] When

ABUNDANCE, FACTORS OF; SURVIVAL AND MORTALITY (CONTINUED)

85-002653 CONTINUED European man arrived on the Pacific Coast, the streams were teeming with salmonids in a natural environment. Since the mid-1800's, a decline in the quality of the salmonid habitat has occurred. One land use reponsible for part of this decline has been improper grazing by both sheep and cattle. The solutions that will reverse this decline rest with range and fishery specialists, who must coordinate their studies and tackle the riparian issue together. They must determine the suitability of each habitat type for grazing, and the correct grazing strategy with proper animal distribution.

85-002654 Quirós, R. and C. Baigún. FISH ABUNDANCE RELATED TO ORGANIC MATTER IN THE PLATA RIVER BASIN, SOUTH AMERICA. *Trans. Am. Fish. Soc.* 114(3):377-387. 1985. SFA 30(3)
[Inst. Nac. Invest., C.C. 175, 7600 Mar del Plata, Argentina]

85-002655 Rago, P. J. and J. G. Wiener. DOES pH AFFECT FISH SPECIES RICHNESS WHEN LAKE AREA IS CONSIDERED? *Bull. Ecol. Soc. Am.* 66(2):252. 1985. Abstract only. SFA 30(3)
[U.S. FWS, Natl. Fish. Cent., Kearneysville, WV] Numerous surveys have shown that fish species richness is positively correlated with lake pH. However, species richness of fish communities is also correlated with lake size, and low pH lakes are often small. We used analysis of covariance and a nonparametric blocked comparison test, to remove effects of lake area and compare fish species richness in low pH and high pH lakes. Data from seven previous surveys of water chemistry and fish communities in lakes of Wisconsin and Ontario were examined. Lakes with low pH (≤6.0) contained significantly fewer fish species than lakes with high pH (>6.0), when the effect of lake area was considered. A simple probabilistic model showed that the statistical power to contrasts of species richness was low when lake areas and the pool of colonizing species were small. We recommend the blocked comparison test for separating the effects of lake area and pH on species richness.

85-002656 Rimmer, D. M. EFFECTS OF REDUCED DISCHARGE ON PRODUCTION AND DISTRIBUTION OF AGE-0 RAINBOW TROUT IN SEMINATURAL CHANNELS. *Trans. Am. Fish. Soc.* 114(3):388-396. 1985. SFA 30(3)
[Dep. Energy Nat. Resour., 9945 108 St., Edmonton, AB T5K 2G6, Canada]

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85-002658 Shulman, M. J. RECRUITMENT OF CORAL REEF FISHES: EFFECTS OF DISTRIBUTION OF PREDATORS AND SHELTER. *Ecology* 66(3):1056-1066. 1985. SFA 30(3)
[Dep. Biol., Univ. Calif., Los Angeles 90024] Factors affecting recruitment and early survivorship of juvenile coral reef fishes were studied on St. Croix, United States Virgin Islands. The faunal assemblage studied included diurnally active fishes found in the rubble/sand habitat. The most abundant members were: beaugregory *(Stegastes leucostictus)*, foureye butterflyfish *(Chaetodon capistratus)*, mahogany snapper *(Lutjanus mahogoni)*, surgeonfishes (*Acanthurus bahianus* and *A. chirurgus*) and French grunt *(Haemulon flavolineatum)*. During the period 1978-1981, sets of experimental reefs constructed from *Strombus gigas* shells were built in various locations relative to a major reef. Recruitment of juveniles of almost all species in the rubble/sand fish assemblage occurred more heavily on reefs that were built 20-40 m away from the main reef (into the lagoon) than on those built at the edge of the backreef. A series of experiments revealed that this is probably due to two factors: differences in available shelter and differences in encounter rates with predators. Seagrass and

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85-002658 CONTINUED algae, which provide shelter to very small juvenile fishes, are absent in a "halo" zone close to the reef due to the feeding activities of reef-associated grazers (fishes and urchins). Experiments with artificially produced halos and artificial seagrass and algae showed that part of the explanation for the observed spatial pattern of fish recruitment is the spatial pattern of the shelter provided by seagrass and algae. Experiments in which potential prey fish were tethered demonstrated that the risk of predation for small juvenile fishes was considerably higher close to the reef than it was 20 m away. The results of these experiments suggest that patterns of settlement and juvenile survivorship of coral reef fishes are affected by complex interactions with other reef organisms (in this case, the activities of reef-associated grazers that modify available shelter) and by the frequency of the encounters with predators. If they survive, all of the juveniles, regardless of where they initially settle, eventually migrate to a nearby reef. The species studied here differed in the degree to which juveniles use the sea-grass/algal habitat as a refuge from predation; these differences suggest that spatial patterns of recruitment, interacting with predation, may influence both population abundances and species composition of older juveniles on the reef.

85-002659 Sinclair, M.; M. J. Tremblay and P. Bernal. EL NIÑO EVENTS AND VARIABILITY IN A PACIFIC MACKEREL *(SCOMBER JAPONICUS)* SURVIVAL INDEX: SUPPORT FOR HJORT'S SECOND HYPOTHESIS. *Can. J. Fish. Aquatic Sci.* 42(3):602-608. 1985. In English with French summ. SFA 30(3)
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85-002660 Skea, J. C.; J. Symula and J. Miccoli. SEPARATING STARVATION LOSSES FROM OTHER EARLY FEEDING FRY MORTALITY IN STEELHEAD TROUT *SALMO GAIRDNERI*, CHINOOK SALMON *ONCORHYNCHUS TSHAWYTSCHA* AND LAKE TROUT *SALVELINUS NAMAYCUSH*. *Bull. Environ. Contam. Toxicol.* 35(1):82-91. 1985. SFA 30(3)
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85-002661 Walters, C. J. and P. Cahoon. EVIDENCE OF DECREASING SPATIAL DIVERSITY IN BRITISH COLUMBIA SALMON STOCKS. *Can. J. Fish. Aquatic Sci.* 42(5):1033-1037. 1985. In English with French summ. SFA 30(3)
[Inst. Anim. Resour. Ecol., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada]

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[G. J. FitzGerald: Dep. Biol., Univ. Laval, PQ G1K 7P4, Canada]

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[Va. Inst. Mar. Sci., Coll. William and Mary in Va., Gloucester Point, VA 23062]

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85-002667 Gaemers, P. A. M. TAXONOMIC POSITIONS OF THE CICHLIDAE (PISCES, PERCIFORMES) AS DEMONSTRATED BY THE MORPHOLOGY OF THEIR OTOLITHS. *Neth. J. Zool.* 34(4):566-595. 1984. SFA 30(3)
[Rijksmus. Geol. Mineral., Hooglandse Kerkgracht 17, 2312 HS Leiden, Netherlands]

85-002668 Goren, M. *TRIMMA FISHELSONI*, A NEW GOBIID FISH FROM THE GULF OF ELAT, NORTHERN RED SEA. *Isr. J. Zool.* 33(1-2):63-67. 1984-1985. SFA 30(3)
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85-002669 Goren, M. A REVIEW OF THE GOBIID FISH GENUS *MONISHIA* SMITH, 1949, FROM THE WESTERN INDIAN OCEAN AND RED SEA, WITH DESCRIPTION OF A NEW SPECIES. *Natl. Mus. Los Angeles Cty. Contrib. Sci.* No. 360. 9p. 1985. SFA 30(3)
[Dep. Zool., Geo. S. Wise Fac. Life Sci., Tel Aviv Univ., Tel Aviv 69978, Israel]

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[Res.-Group Ecol. Morphol., Zool. Lab., Rijksuniv. Leiden, PB 9516, 2300 RA Leiden, Netherlands]

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[Dep. Zool., Br. Mus. (Nat. Hist.), Cromwell Rd., London SW7 5BD, England]

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85-002676 Mago-Leccia, F.; J. G. Lundberg and J. N. Baskin. SYSTEMATICS OF THE SOUTH AMERICAN FRESHWATER FISH GENUS *ADONTOSTERNARCHUS* (GYMNOTIFORMES, APTERONOTIDAE). *Natl. Mus. Los Angeles Cty. Contrib. Sci.* No. 358. 19p. 1985. In English with Spanish summ. SFA 30(3)
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[Dep. Vert. Zool., Natl. Mus. Nat. Hist., Smithsonian Inst., Washington, DC 20560]

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[Dep. Ichthyol. Herpetol., R. Ont. Mus., 100 Queen's Park, Toronto, ON M5S 2C6, Canada]

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PARASITES AND DISEASES-GENERAL

85-002690 European Association of Fish Pathologists. SECOND MEETING OF THE GERMAN SECTION OF THE EAFP, 25-26 SEPTEMBER 1984, HAMBURG. *Bull. Env. Assoc. Fish. Pathol.* 4(4):61-82. 1984. From Vet. Bull. 55(5):368. 1985. A collection of abstracts.--RS SFA 30(3)

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Experiments were conducted to measure the agglutinating antibody response of channel catfish to a particulate and a soluble antigen administered simultaneously by one of three routes. Specific antibody production in response to administration of particulate brucella tube-test antigen via intramuscular injection, oral drench, and topical application peaked at 3 weeks in channel catfish held under identical conditions at 21°C. The humoral antibody response was greater in fish injected with antigen than in the orally or topically exposed channel catfish. Specific antibody was also produced by the same channel catfish in response to the administration of a soluble ciliary preparation derived from *Tetrahymena pyriformis* Lywoff. Intramuscular injection of *Tetrahymena* antigen was the only route that produced detectable levels of circulating antibody as measured by direct agglutination of live *T. pyriformis* cells. The response to the soluble antigen also peaked at 3 weeks. Neither antigen elicited detectable agglutinins in cutaneous mucus, regardless of the vaccination method used.

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[Inst. Limnol., Univ. Lund, Box 3060, S-220 03 Lund, Sweden] The effect of copper (1, 13, 22, 39 and 81 $\mu g \cdot l^{-1}$) on the maximal growth rate of perch (*Perca fluviatilis*) was followed for 30 days. After

TOXICOLOGY; BIOASSAYS (CONTINUED)

85-002810 CONTINUED that, previously available food (*Gammarus pulex*) was removed and the starvation rates determined. Copper reduced the maximal growth rate at concentrations >22 µg $Cu \cdot l^{-1}$. This reduction was mainly an effect of reduced food conversion efficiency, which was itself attributed to an increase in standard metabolism due to detoxication. Only at the highest concentration was food intake reduced. The reduction was immediate and food intake then remained at a constant and low level. In terms of growth and food conversion, the perch acclimated at the lowest effect-concentration, and started to acclimate at the highest concentration, but did not acclimate at all in terms of food consumption. Starved and acclimated perch lost weight at higher rates than starved and unexposed perch. This demonstrated that acclimated perch were still affected by copper due to increased energetic costs during conditions of starvation.

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[Div. Clin. Pharmacol., Hosp. Sick Children, 555 University Ave., Toronto, ON M5G 1X8, Canada]

85-002812 Denison, M. S.; J. E. Chambers and J. D. Yarbrough. SHORT-TERM INTERACTIONS BETWEEN DDT AND ENDRIN ACCUMULATION AND ELIMINATION IN MOSQUITOFISH *(GAMBUSIA AFFINIS). Arch. Environ. Contam. Toxicol.* 14(3):315-320. 1985. SFA 30(3)
[J. E. Chambers: Dep. Biol. Sci., P.O. Drawer GY, Mississippi State Univ., MS 39762]

85-002813 Dick, P. T. and D. G. Dixon. CHANGES IN CIRCULATING BLOOD CELL LEVELS OF RAINBOW TROUT, *SALMO GAIRDNERI* RICHARDSON, FOLLOWING ACUTE AND CHRONIC EXPOSURE TO COPPER. *J. Fish Biol.* 26(4):475-481. 1985. SFA 30(3)
[D. G. Dixon: Dep. Biol., Univ. Waterloo, Waterloo, ON N2L 3G1, Canada]

85-002814 Dixon, D. G. and J. W. Hilton. EFFECTS OF AVAILABLE DIETARY CARBOHYDRATE AND WATER TEMPERATURE ON THE CHRONIC TOXICITY OF WATERBORNE COPPER TO RAINBOW TROUT *(SALMO GAIRDNERI). Can. J. Fish. Aquatic Sci.* 42(5):1007-1013. 1985. In English with French summ. SFA 30(3)
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85-002815 Eddy, F. B. and C. Talbot. SODIUM BALANCE IN EGGS AND DECHORIONATED EMBRYOS OF THE ATLANTIC SALMON *SALMO SALAR* L. EXPOSED TO ZINC, ALUMINUM AND ACID WATERS. *Comp. Biochem. Physiol. C Comp. Pharmacol. Toxicol.* 81(2):259-266. 1985. SFA 30(3)
[Dep. Biol. Sci., The University, Dundee DD1 4HN, U.K.] Ionic regulation of eyed eggs of Atlantic salmon was studied using intact eggs and embryos from which the chorion and perivitelline fluid had been removed, a preparation which remained in good condition for at least 2 weeks. Both intact eggs and embryos in freshwater showed similar Na^+ influx rates (0.0064 and 0.01 µ Mg^{-1} hr^{-1}, respectively) but Na^+ efflux rates (0.0024 and 0.0064 µ M g^{-1} hr^{-1}, respectively) were greater in embryos, suggesting that the perivitelline fluid which is known to bind cations has an important function in preventing Na^+ loss from the yolk and embryo. Over 90% of the egg Na^+ is located in the yolk and embryo but only about 10% is exchangeable while the chorion contains about 8% Na^+ which is non-exchangeable. Both eggs and embryos in acid water at pH 4, in Zn^{2+} 5mMl^{-1} and in aluminum 1 mM l^{-1} showed greatly reduced Na^+ uptake but eggs in 10 µ M l^{-1} aluminum or 100 µ M l^{-1} Zn^{2+} showed normal Na^+ balance while embryos were normal in 10µ M l^{-1} aluminum but showed reduced Na^+ uptake in 100 µ M l^{-1} Zn^{2+}.

TOXICOLOGY; BIOASSAYS (CONTINUED)

85-002815 CONTINUED It is concluded that the chorion and perivitelline fluid have a capacity to protect the embryo from metal ions and acid water.

85-002816 Eilers, J. M.; G. J. Lien and R. G. Berg. AQUATIC ORGANISMS IN ACIDIC ENVIRONMENTS: A LITERATURE REVIEW. *Wis. Dep. Nat. Resour. Tech. Bull.* No. 150. 18p. 1984. SFA 30(3)

85-002817 Eisler, R. MIREX HAZARDS TO FISH, WILDLIFE, AND INVERTEBRATES: A SYNOPTIC REVIEW. *U.S. Fish Wildl. Serv. Biol. Rep.* 85(1.1). vii + 42p. 1984. SFA 30(3)
[Patuxent Wildl. Res. Cent., U.S. Fish Wildl. Serv., Laurel, MD 20708]

85-002818 Erickson, R. J. AN EVALUATION OF MATHEMATICAL MODELS FOR THE EFFECTS OF pH AND TEMPERATURE ON AMMONIA TOXICITY TO AQUATIC ORGANISMS. *Water Res.* 19(8):1047-1058. 1985. SFA 40(3)
[U.S. EPA, 6201 Congdon Blvd., Duluth, MN 55804] Available data on the pH and temperature dependence of ammonia toxicity to aquatic organisms were examined and their agreement with various models was evaluated. A model which considers alteration of the relative concentration of un-ionized ammonia at the gill surface failed to adequately describe either pH or temperature d pendence. A model that assumes that un-ionized ammonia and ammonium ion are jointly toxic was strongly supported by the data on pH dependence, but could not explain observed temperature dependence. Temperature dependence can be described empirically by a simple log-linear model. The effects of pH and temperature were generally found to be qualitatively and quantitatively similar among fish species.

85-002819 Fitzmayer, K. M.; J. G. Geiger and M. J. Van Den Avyle. ACUTE TOXICITY EFFECTS OF SIMAZINE ON *DAPHNIA PULEX* AND LARVEL STRIPED BASS. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:146-156. 1982. SFA 30(3)
[U.S. FWS, Southeast. Fish Cult. Lab., Marion, AL 36756] Tests were performed to determine the acute toxicity of simazine, a herbicide commonly used in pond aquaculture, to the cladoceran *Daphnia pulex* and to 3- and 7-day old larval striped bass (*Morone saxatilis*). The 48-hour LC50 for 3-day-old striped bass was 18 mg/liter in hard water (220 mg/liter as $CaCo_3$) and 16 mg/liter in soft water (120 mg/liter as $CaCo_3$); corresponding estimates for 7-day-old larvae exceeded 100 mg/liter. The estimated 48-hour LC50 for *D. pulex* exceeded 50 mg/liter in both hard and soft water. These estimates were considerably higher than recommended pond application rates of simazine, but abnormal behavioral responses of both test organisms to sublethal concentrations suggested that long-term exposure could be harmful. Inasmuch as 7-day-old larvae were far less sensitive than 3-day-old larvae, the timing of simazine applications in relation to age of fish could have pronounced effects on survival of striped bass in ponds.

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85-002822 Hall, L. W., Jr. and A. E. Pinkney. ACUTE AND SUBLETHAL EFFECTS OF ORGANOTIN COMPOUNDS ON AQUATIC BIOTA: AN INTERPRETATIVE LITERATURE EVALUATION. *Crit. Rev. Toxicol.* 14(2):159-209. 1985. SFA 30(3)
[Appl Phys. Lab., Johns Hopkins Univ., Shady Side, MD]

85-002823 Hanson, L. A. and J. M. Grizzle. NITRITE-INDUCED PREDISPOSITION OF CHANNEL CATFISH TO BACTERIAL DISEASES. *Prog. Fish-Cult.* 47(2):98-101. 1985. SFA 30(3)
[Dep. Fish. Allied Aquacult., Ala. Agric. Exp. Stn., Auburn Univ., AL 36849]

85-002824 Harrass, M. C.; L. J. Shannon; J. D. Yount and C. T. Walbridge. EFFECTS OF STRAIGHT-CHAIN ALCOHOLS ON MICROCOSM COMMUNITIES AND COMPARISON WITH FATHEAD MINNOW TOXICITIES. *Bull. Ecol. Soc. Am.* 66(2):188. 1985. Abstract only. SFA 30(3)
[Univ. Minn., Duluth]

85-002825 Heisinger, J. F. and L. Scott. SELENIUM PREVENTS MERCURIC CHLORIDE INDUCED ACUTE OSMOREGULATORY FAILURE WITHOUT GLUTATHIONE PEROXIDASE INVOLVEMENT IN THE BLACK BULLHEAD *(ICTALURUS MELAS). Comp. Biochem. Physiol. C Comp. Pharmacol. Toxicol.* 80(2):295-297. 1985. SFA 30(3)
[Dep. Biol., Univ. S. Dak., Vermillion 57069]

85-002826 Hermanutz, R. O.; J. G. Eaton and L. H. Mueller. TOXICITY OF ENDRIN AND MALATHION MIXTURES TO FLAGFISH *(JORDANELLA FLORIDAE). Arch. Environ. Contam. Toxicol.* 14(3):307-314. 1985. SFA 30(3)
[Monticello Ecol. Res. Stn., Monticello, MN 55362] Individual endrin and malathion concentrations and mixtures of the concentrations were tested concurrently with flagfish in both chronic and acute exposures. The joint action of mixtures on mortality in chronic exposures consisted of enhanced effects at the higher concentrations not causing death when the pesticides were tested individually. Chronic effects of mixtures on growth followed a simple additive effects model. Malathion did not alter the endrin effects on egg production, and in a separate test it did not affect the uptake or elimination of endrin. Joint action on mortality in acute exposures occurred at 48 and 72 hr but not at 10 and 24 hr.

85-002827 Hilmy, A. M.; M. B. Shabana and A. Y. Daabees. EFFECTS OF CADMIUM TOXICITY UPON THE *IN VIVO* AND *IN VITRO* ACTIVITY OF PROTEINS AND FIVE ENZYMES IN BLOOD SERUM AND TISSUE HOMOGENATES OF *MUGIL CEPHALUS. Comp. Biochem. Physiol. C Comp. Pharmacol. Toxicol.* 81(1):145-153. 1985. SFA 30(3)
[Dep. Zool., Fac. Sci., Alexandria Univ., Alexandria, Egypt]

85-002828 Hilmy, A. M.; M. B. Shabana and A. Y. Daabees. BIOACCUMULATION OF CADMIUM: TOXICITY IN *MUGIL CEPHALUS. Comp. Biochem. Physiol. C Comp. Pharmacol. Toxicol.* 81(1):139-143. 1985. SFA 30(3)
[Dep. Zool., Fac. Sci., Alexandria Univ., Alexandria, Egypt]

85-002829 Hodson, P. V. and D. J. Spry. EFFECT OF SULFITE DECHLORINATION ON THE ACCUMULATION OF WATERBORNE LEAD BY RAINBOW TROUT *(SALMO GAIRDNERI). Can. J. Fish. Aquatic Sci.* 42(4):841-844. 1985. In English with French summ. SFA 30(3)
[Great Lakes Fish. Res. Br., Can. Cent. Inland Waters, Burlington, ON L7R 4A6, Canada]

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85-002830 Koli, A. K.; R. Whitmore and W. Roache. BEHAVIOR OF CESIUM IN FISH TISSUES FROM SAVANNAH RIVER. *Environ. Int.* 11(1):23-24. 1985. SFA 30(3)
[S.C. State Coll., Orangeburg, SC] A survey of cesium residues in fish from the Savannah River near the Savannah River Nuclear Plant was undertaken in 1983. Fish tissues, bone, fin, and muscle were incubated by the wet digestion method for analysis. Seventeen fish samples were analyzed by flame atomic absorption spectrophotemetry procedure to determine cesium content. It was found that cesium concentration levels were consistently higher in the bones and fins than in muscles of all fish species. It seems that cesium concentration levels were relatively higher in fins than in bones. Cesium concentration levels in muscle tissues were negligible in all fish species.

85-002831 Koltes, K. H. EFFECTS OF SUBLETHAL COPPER CONCENTRATIONS ON THE STRUCTURE AND ACTIVITY OF ATLANTIC SILVERSIDE SCHOOLS. *Trans. Am. Fish. Soc.* 114(3):413-422. 1985. SFA 30(3)
[Mar. Syst. Lab., NHB W-310, Smithsonian Inst., Washington, DC 20560]

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[Dep. Zool., D.S.B. Campus, Kumaun Univ., Naini Tal-263002, U.P., India]

85-002833 Lemly, A. D. and R. J. F. Smith. EFFECTS OF ACUTE EXPOSURE TO ACIDIFIED WATER ON THE BEHAVIOR RESPONSE OF FATHEAD MINNOWS, *PIMEPHALES PROMELAS*, TO CHEMICAL FEEDING STIMULI. *Aquatic Toxicol.* 6(1):25-36. 1985. SFA 30(3)
[Dep. Biol., Univ. Saskatchewan, Saskatoon, SK S7N 0W0, Canada]

85-002834 Lewis, D. H.; R. J. Tarpley; J. E. Marks and R. F. Sis. DRUG INDUCED STRUCTURAL CHANGES IN OLFACTORY ORGAN OF CHANNEL CATFISH *ICTALURUS PUNCTATUS*, RAFINESQUE. *J. Fish Biol.* 26(2):355-358. 1985. SFA 30(3)
[Dep. Vet. Microbiol., Coll. Vet. Med., Tex. A&M Univ., College Station 77843] The fish anaesthetic tricaine methanosulfate destroyed the cilia on olfactory sensory epithelia of channel catfish, when fish were exposed to tranquilizing doses of the drug. Cilia on the non sensory epithelium appeared to be unaffected by multiple exposures of the drug. Sensory cilia regenerated within 28 days after exposure.

85-002835 Luk'yanov, A. S.; S. S. Sidorov and O. Y. Frolov. THE OPTOMOTOR REACTION OF CARP, *CYPRINUS CARPIO* (CYPRINIDAE), EXPOSED TO PHENOL. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 24(5):49-54. 1984. SFA 30(3)
[Biol. Fac., Moscow Univ., USSR]

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[Dep. Zool., Wash. State Univ., Pullman 99164-4220]

85-002837 McKeown, B. A.; G. H. Geen; T. A. Watson; J. F. Powell and D. B. Parker. THE EFFECT OF pH ON PLASMA ELECTROLYTES, CARBONIC ANHYDRASE AND ATPase ACTIVITIES IN RAINBOW TROUT *(SALMO GAIRDNERI)* AND LARGESCALE SUCKERS *(CATOSTOMUS MACROCHEILUS). Comp. Biochem. Physiol. A Comp. Physiol.* 80(4):507-514. 1985. SFA 30(3)
[Dep. Biol. Sci., Simon Fraser Univ., Burnaby, BC V5A 1S6, Canada]

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85-002839 Natarajan, G. M. DISRUPTION OF CIRCADIAN RHYTHM OF TISSUE RESPIRATION IN *CHANA STRIATUS* BY METASYSTOX. *Experientia (Basel)* 41(5):612-614. 1985. SFA 30(3)
[Dep. Zool., Bharathiar Univ., Coimbatore 641046, India]

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[Natl. Vet. Inst., P.O. Box 8156 Dep., N-0033 Oslo 1, Norway]

85-002841 Olsén, K. H. and L. B. Höglund. REDUCTION BY A SURFACTANT OF OLFACTORY MEDIATED ATTRACTION BETWEEN JUVENILES OF ARCTIC CHARR, *SALVELINUS ALPINUS* (L.). *Aquatic Toxicol.* 6(1):57-69. 1985. SFA 30(3)
[Dep. Zoophysiol., Uppsala Univ., Box 560, S-751 22 Uppsala, Sweden]

85-002842 Oris, J. T. and J. P. Giesy, Jr. THE PHOTOENHANCED TOXICITY OF ANTHRACENE TO JUVENILE SUNFISH (*LEPOMIS* SPP.). *Aquatic Toxicol.* 6(2):133-146. 1985. SFA 30(3)
[Dep. Fish. Wildl., Mich. State Univ., East Lansing 48824]

85-002843 Ross, L. G. and B. Ross. ANAESTHETIC AND SEDATIVE TECHNIQUES FOR FISH. *Inst. Aquacult. Univ. Stirling* vii+40p. 1984. From Vet. Bull. 55(4):313. 1985. SFA 30(3)
[Inst. Aquacult., Univ. Stirling, Stirling FK9 4LA, Scotland]

85-002844 Roubal, W. T. and D. C. Malins. FREE RADICAL DERIVATIVES OF NITROGEN HETEROCYCLES IN LIVERS OF ENGLISH SOLE (*PAROPHRYS VETULUS*) WITH HEPATIC NEOPLASMS AND OTHER LIVER LESIONS. *Aquatic Toxicol.* 6(2):87-103. 1985. SFA 30(3)
[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112]

85-002845 Sado, E. K. INFLUENCE OF THE ANAESTHETIC QUINALDINE ON SOME TILAPIAS. *Aquaculture* 46(1):55-62. 1985. SFA 30(3)
[Kainji Lake Res. Inst., P.B. Bag 666, New Bussa, Kwara State, Nigeria]

85-002846 Segner, H. and V. Storch. INFLUENCE OF WATER-BORNE IRON ON THE LIVER OF *POECILIA RETICULATA* (PETERS 1859). *J. Appl. Ichthyol.* 1(1):39-47. 1985. In English with German and French summ. SFA 30(3)
[Zool. Inst.; Univ. Heidelberg, Im Neuenheimer Feld 230, 6900 Heidelberg, West Germany] The influence of water-borne iron ($500\mu g \times l^{-1}$ and $2\ mg \times l^{-1}$) on the liver of *Poecilia reticulata* is studied by means of electron microscopy. The uptake and effect of iron is affected by a. the chemical speciation of the metal: Iron complexed with tri-polyphosphates is more deleterious than inorganic Fe^{3+}; b. the nutritional status of the fish: In food-deprived *Poecilia reticulata* iron is absorbed and enhances starvation-induced liver damage. In fed animals, there is no uptake at all. Mild alterations of hepatocyte ultrastructure are attributed to an unspecific stress response.

TOXICOLOGY; BIOASSAYS (CONTINUED)

85-002847 Somasundaram, B.; P. E. King and S. E. Shackley. THE EFFECT OF ZINC ON THE ULTRASTRUCTURE OF THE POSTERIOR GUT AND PRONEPHRIC DUCTS OF THE LARVA OF *CLUPEA HARENGUS* L. *Comp. Biochem. Physiol. C Comp. Pharmacol. Toxicol.* 81(1):29-37. 1985. SFA 30(3)

[Dep. Zool., Univ. Coll. Swansea, Singleton Park, Swansea, U.K.] The ultrastructural changes in the posterior gut and pronephric ducts of *Clupea harengus* L. larvae, hatched from eggs incubated in four zinc concentrations (0.5, 2.0, 6.0 and 12.0 ppm), were examined by morphometric analysis. The fine structure of both tissues was affected by zinc at 6.0 and 12.0 ppm zinc. The endoplasmic reticulum, perinuclear space and the mitochondria were swollen and a reduction in the surface-to-volume ratio of the mitochondrial cristae was observed. At the highest concentration the posterior gut cells showed signs of necrosis. In the pronephric ducts the endoplasmic reticulum forms masses of nodules in which granular inclusions occur. The implications of these sub-cellular changes in relation to the survival potential of the larvae are discussed.

85-002848 Takashima, F.; W. Zhaoming; H. Kasai and O. Asakawa. [SUSTAINED ANESTHESIA WITH 2-PHENOXYETHANOL IN YEARLING RAINBOW TROUT.] *J. Tokyo Univ. Fish.* 69(2):93-96. 1983. In Japanese with English summ. SFA 30(3)

[Lab. Fish.-Cult., Tokyo Univ. Fish., 5-7, Konan 4, Minato-ku, Tokyo 108, Japan]

85-002849 Watenpaugh, D. E. and T. L. Beitinger. NITRITE EXPOSURE AND RESPIRATION RATES IN FATHEAD MINNOWS. *Bull. Environ. Contam. Toxicol.* 35(1):106-111. 1985. SFA 30(3)

[Dep. Biol. Sci., North Tex. State Univ., Denton 76203]

85-002850 Watenpaugh, D. E. and T. L. Beitinger. SWIMMING PERFORMANCE OF CHANNEL CATFISH *(ICTALURUS PUNCTATUS)* AFTER NITRITE EXPOSURE. *Bull. Environ. Contam. Toxicol.* 34(5):754-760. 1985. SFA 30(3)

[T. L. Beitinger: Inst. Appl. Sci., North Tex. State Univ., Denton 76203]

85-002851 Watenpaugh, D. E.; T. L. Beitinger and D. W. Huey. TEMPERATURE TOLERANCE OF NITRITE-EXPOSED CHANNEL CATFISH. *Trans. Am. Fish. Soc.* 114(2):274-278. 1985. SFA 30(3)

[Dep. Biol. Sci., Inst. Appl. Sci., North Tex. State Univ., Denton 76203]

85-002852 Watenpaugh, D. E. SUBLETHAL EFFECTS OF NITRITE AND SELENATE ON TWO SPECIES OF FRESHWATER FISH. *M.S. thesis, North Tex. State Univ.* 137p. 1984. From Masters Abstr. 23(1):106-107. 1985. SFA 30(3)

Physiological and behavioral effects of exposure of fathead minnows (*Pimephales promelas*) and channel catfish (*Ictalurus punctatus*) to selenate-selenium (Se) and nitrite were investigated. Routine oxygen consumption of minnows was unaffected by acute exposure to Se. Effects may have been masked by physiological compensatory responses of dosed minnows. Se exposures of fathead minnows significantly reduced their upper thermal tolerance. No avoidance of lethal Se concentrations was observed in minnows experiencing Se concentration gradients. Nitrite exposure reduced routine oxygen consumption rates of fathead minnows. Acute exposure of channel catfish to nitrite increased blood methemoglobin levels. Nitrite exposure significantly reduced thermal tolerance, hypoxic resistance, and swimming performance of catfish. Correlations between decreased physiological performance and elevated methemoglobin were observed in each test of nitrite's effects on catfish.

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85-002853 Watenpaugh, D.E. and T. L. Beitinger. Se EXPOSURE AND TEMPERATURE TOLERANCE OF FATHEAD MINNOWS, *PIMEPHALES PROMELAS*. *J. Therm. Biol.* 10(2):83-86. 1985. SFA 30(3)
[Dep. Biol. Sci., North Tex. State Univ., Denton 76203]

85-002854 Watras, C. J.; J. MacFarlane and F. M. M. Morel. NICKEL ACCUMULATION BY *SCENEDESMUS* AND *DAPHNIA*: FOOD-CHAIN TRANSPORT AND GEOCHEMICAL IMPLICATIONS. *Can. J. Fish. Aquatic Sci.* 42(4):724-730. 1985. In English with French summ. SFA 30(3)
[Cent. Limnol., Trout Lake Lab., Univ. Wis., Boulder Junction 54512]

85-002855 Zitko, V.; L. E. Burridge; M. Woodside and V. Jerome. MORTALITIES OF JUVENILE ATLANTIC SALMON CAUSED BY THE FUNGICIDE OBPA. *Can. Tech. Rep. Fish. Aquatic Sci.* No. 1358. iii + 28p. 1985. In English with French summ. SFA 30(3)
[Biol. Stn., St. Andrews, NB E0G 2X0, Canada] The most probable cause of the mortalities is the fungicide OBPA, 10, 10'-oxybis-10H-phenoxarsine, present in a plastic liner of the fish tanks. Such a liner must not be used in aquaculture systems based on water recirculation and we do not recommend its presence even in flow-through systems since chronic effects of OBPA are unknown and OBPA is not registered for this application. Results of the analyses of fish, fish food, and plastic liners for heavy metals and organic chemicals are described.

FISH TOXICANTS

85-002856 Marking, L. L. and T. D. Bills. EFFECTS OF CONTAMINANTS ON TOXICITY OF THE LAMPRICIDES TFM AND BAYER 73 TO THREE SPECIES OF FISH. *J. Great Lakes Res.* 11(2):171-178. 1985. SFA 30(3)
[U.S. FWS, Natl. Fish. Res. Lab., P.O. Box 818, La Crosse, WI 54602-0818]

RESEARCH AND MANAGEMENT-GENERAL

85-002857 Baughman, J. A BRIEF HISTORY OF THE GOLDEN TROUT. *Fisheries (Bull. Am. Fish. Soc.)* 10(2):2. 1985. SFA 30(3)
[Wyo. Game Fish. Dep., Cheyenne]

85-002858 Belusz, L. C. MISSOURI'S KIDS FISHING PROGRAM: GETTING THEM HOOKED ON THE AGENCY. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:770-774. 1982. SFA 30(3)
[Mo. Dep. Conserv., P.O. Box 180, Jefferson City 65102]

85-002859 Busiahn, T. R. AN INTRODUCTION TO NATIVE PEOPLE'S FISHERIES ISSUES IN NORTH AMERICA. *Renewable Resour. J.* 3(2):23-26. 1985. SFA 30(3)

85-002860 Fried, S. M. and H. J. Yuen. A SYNOPSIS AND CRITIQUE OF FORECASTS OF SOCKEYE SALMON (*ONCORHYNCHUS NERKA*) RETURNING TO BRISTOL BAY IN 1985. *Alaska Dep. Fish Game Inf. Leafl.* No. 247. iii + 40p. 1985. SFA 30(3)
[Alaska Dep. Fish Game, Div. Commer. Fish., Juneau, AK]

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85-002861 George, C. J. NOTES ON THE PERUVIAN FISHERIES. *Fisheries (Bull. Am. Fish. Soc.)* 10(3):13-17. 1985. SFA 30(3)
[Union Coll., Schenectady, NY]

85-002862 Hamel, P. B. and M. O. Efird. WILDLIFE AND FISH HABITAT RELATIONSHIPS DATA BASE FOR THE FOREST SERVICE SOUTHERN REGION. *Proc. Workshop Manage. Nongame Species Ecol. Commun.* 44-52. (1984)1985. SFA 30(3)
[Tenn. Nat. Heritage Div., Dep. Conserv., 701 Broadway, Nashville 37203] Data on geographic occurrence, habitat relationships, and habitat requirements have been consolidated into an automated data base for 1400 vertebrate species that occur on southern National Forests. The system relies on data definition standards proposed in the USFWS "Procedures", utilizes the experience of RUN WILD III, and employs the System 2000 hierarchical data base management software. Design of the data base entailed development of a set of normalized relations and subsequent rearrangement of these relations into the more restrictive hierarchical format. Primary criterion for inclusion of a species consisted of occurrence as a resident on National Forest land in the South. Data for the system resulted from extensive review of pertinent literature, synthesis of new information, and opinion of experts. Protocols for periodic update have been established. Independent field validation of habitat relationsihps data is a vitally important part of wildlife data base projects. Initial examination of avifauna of oak-hickory forests produced satisfactory agreement between predicted and observed relationships. A number of critical issues have surfaced in this project. Some are biological and usually represent lack of important data. Some relate specifically to data bases and include redundancy and inconsistency of data, data independence, and the importance of careful data base design that permits future flexibility.

85-002863 Hankin, D. G. SALMON ENHANCEMENT STRATEGIES AND WILD STOCKS: EVALUATION OF ENHANCEMENT SUCCESS AND WILD STOCK IMPACTS. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 52-61. 1981. Available @ $7.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Dep. Fish., Humboldt State Univ., Arcata, CA 95521]

85-002864 Hightower, J. E. and G. D. Grossman. COMPARISON OF CONSTANT EFFORT HARVEST POLICIES FOR FISH STOCKS WITH VARIABLE RECRUITMENT. *Can. J. Fish. Aquatic Sci.* 42(5):982-988. 1985. In English with French summ. SFA 30(3)
[NMFS, 3150 Paradise Dr., Tiburon, CA 94920]

85-002865 Logan, G. AN OVERVIEW OF THE SOCIAL AND POLITICAL ASPECTS OF THE SALMONID ENHANCEMENT PROGRAM (S.E.P.). *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 272-278. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Dep. Fish Oceans, Salmonid Enhancement Prog., British Columbia, Canada]

85-002866 Meyer, P. A. VALUING HABITAT SUPPORTIVE OF FISH AND WILDLIFE. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 279-300. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[2513 Seville Ct., Davis, CA 95616]

85-002867 Netboy, A. THE NEED FOR NEW SOCIAL AND ECONOMIC ATTITUDES TO SAVE THE ANADROMOUS FISHERIES: THE COLUMBIA RIVER A CASE HISTORY. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.*

RESEARCH AND MANAGEMENT-GENERAL (CONTINUED)

85-002867 CONTINUED p. 8-12. 1981. Available @ $7.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Jacksonville, OR 97530]

85-002868 Netsch, N. and R. E. Putz. WILD TROUT IN ALASKA-NOW AND FUTURE. *Fisheries (Bull. Am. Fish. Soc.)* 10(3):8-12. 1985. SFA 30(3)

85-002869 Nielsen, L. A. PHILOSOPHIES OF MANAGING COMPETITIVE FISHING. *Fisheries (Bull. Am. Fish. Soc.)* 10(3):5-7. 1985. SFA 30(3)
[VPI & SU, Blacksburg, VA]

85-002870 Radonski, G. C. and R. G. Martin. FISHERIES ADVANCES SINCE THE THIRTIES. *Fisheries (Bull. Am. Fish. Soc.)* 10(3):2-4. 1985. SFA 30(3)
[Sport Fishing Inst., Washington, DC]

85-002871 Regier, H. A. and A. P. Grima. FISHERY RESOURCE ALLOCATION: AN EXPLORATORY ESSAY. *Can. J. Fish. Aquatic Sci.* 42(4):845-859. 1985. In English with French summ. SFA 30(3)
[Inst. Environ. Stud., Univ. Toronto, Toronto, ON M5S 1A4, Canada]

85-002872 U.S. Fish and Wildlife Service. POTENTIAL FUNDING SOURCES TO IMPLEMENT THE FISH AND WILDLIFE CONSERVATION ACT OF 1980. *U.S. Fish Wildl. Serv. Biol. Rep.* 85(5):ix + 205 p. 1985. SFA 30(3)
[Dep. Interior, Washington, DC 20240]

85-002873 Winters, G. H. and J. P. Wheeler. INTERACTION BETWEEN STOCK AREA, STOCK ABUNDANCE, AND CATCHABILITY COEFFICIENT. *Can. J. Fish. Aquatic Sci.* 42(5):989-998. 1985. In English with French summ. SFA 30(3)
[Dep. Fish. Oceans, P.O. Box 5667, St. John's, NF A1C 5X1, Canada]

HABITAT ALTERATIONS

85-002874 Anderson, J. W. ANADROMOUS FISH PROJECTS 1981 USDI-BLM COOS BAY DISTRICT. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 109-114. 1981. Available @ $7.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[U.S. BLM, Coos Bay, OR 97420]

85-002875 Bilby, R. E. and P. A. Bisson. ENVIRONMENTAL FACTORS INFLUENCING THE DOWNSTREAM MOVEMENT OF COHO SALMON FRY IN OLD-GROWTH AND CLEARCUT WATERSHEDS. *Bull. Ecol. Soc. Am.* 66(2):142. 1985. Abstract only. SFA 30(3)
[Weyerhaeuser For. Res. Cent., Centralia, WA] Coho salmon fry were released in 1982 and 1983 into a stream draining a clearcut watershed and one draining a watershed forested with old-growth conifers in western Washington. Fish traps were installed on both streams to monitor emigration of the fry. Estimation of density of fry remaining in the streams and their size was made periodically by electrofishing. Fry exhibited a high rate of emigration for two weeks after release with an average of 50% of the fish leaving the clearcut system and 17% moving from the the forested system. The higher degree of residency coupled with lower autotrophic production in the forested system likely caused the observed high mortality rate and slow growth of coho. After the initial pulse of movement, emigration was highest during

HABITAT ALTERATIONS (CONTINUED)

85-002875 CONTINUED periods of rising flow, up to a certain level. Above this threshold discharge emigration essentially stopped. Dropping water temperature was also a factor in triggering emigration. An increase in downstream emigration coincided with the first several autumn storms on both streams, although rates were far lower than those seen immediately after stocking.

85-002876 Crispin, V. A. STREAM REHABILITATION OF THE WEST FORK DEER CREEK, NEVADA. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 69-76. 1981. Available @ $7.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[U.S. BLM, Elko, NV 89801] The West Fork of Deer Creek, a small stream in northeast Nevada, was studied inside a cattle exclosure and compared to grazed sections. The stream habitat in the exclosure improved from poor to excellent during three years of rest from grazing. The grazed area remained in poor condition. Habitat improvements in the exclosure included better pool-riffle ratio, increased pool quality, more desirable bottom substrate, and better streambank stability. Width decreased 47 percent and depth increased 16 percent. Summer water temperatures decreased and the trout populations extended downstream.

85-002877 Current, W. N. RIPARIAN HABITAT MANAGEMENT ON THE MALHEUR NATIONAL FOREST. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 77-81. 1981. Available @ $7.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Malheur Natl. For., John Day, OR 97845] The Malheur National Forest in east-central Oregon contains diverse resources including significant amounts of forage and fish. Historically, range use by livestock has been emphasized, which given the dry, semiarid climate, tended to cause significant pressure on riparian areas. Recently, other riparian values, particularly fish, have also received emphasis. The Forest has been moving to a more balanced use of riparian areas during the last decade, first by emphasizing riparian utilization standards and more recently by using interdisciplinary range allotment planning. The more recent direction stresses the identification of riparian objectives, followed by a prescription to attain those objectives.

85-002878 Guymon, E. and E. G. Ekman. WATERSHED IMPROVEMENT PROJECT ON THE MENDOCINO NATIONAL FOREST. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 66-68. 1981. Available @ $7.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Mendocino Natl. For., Willows, CA 95988]

85-002879 Hall, J. D. EVALUATING FISH RESPONSE TO ARTIFICIAL STREAM STRUCTURES: PROBLEMS AND PROGRESS. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 214-221. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Dep. Fish. Wildl., Oreg. State Univ., Corvallis 97331]

85-002880 Hamilton, K. and P. C. Nelson. HABITAT SUITABILITY INDEX MODELS AND INSTREAM FLOW SUITABILITY INDEX CURVES: WHITE BASS. *U.S. Fish Wildl. Serv. Biol. Rep.* 82(10.89). vi + 35p. 1984. SFA 30(3)
[U.S. FWS, 2627 Redwing Rd., Fort Collins, CO 80526-2899]

85-002881 House, R. A. and P. L. Boehne. EVALUATION OF INSTREAM ENHANCEMENT STRUCTURES FOR SALMONID SPAWNING AND REARING IN A COASTAL OREGON STREAM. *N. Am. J. Fish. Manage.* 5(2B):283-295. 1985. SFA 30(3)
[Bur. Land Manage., Salem Dist., P.O. Box 3227, Salem, OR 97302]

HABITAT ALTERATIONS (CONTINUED)

85-002882 Klingeman, P. C. EVALUATING HYDROLOGIC NEEDS FOR DESIGN OF STREAM HABITAT MODIFICATION STRUCTURES. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 191-213. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Water Resour. Res. Inst., Oreg. State Univ., Corvallis 97331]

85-002883 Klock, G. O. MODELING THE CUMULATIVE EFFECTS OF FOREST PRACTICES ON DOWNSTREAM AQUATIC ECOSYSTEMS. *J. Soil Water Conserv.* 40(2):237-241. 1985. SFA 30(3)
[G.O. Klock & Assoc., 2113 Sunrise Circle, Wenatchee, WA 98801]

85-002884 LaBounty, J. F.; J. J. Sartoris and D. M. Lieberman. EFFECTS OF OPERATING MT. ELBERT PUMPED-STORAGE POWERPLANT ON TWIN LAKES, COLORADO: 1982 REPORT OF FINDINGS. *U.S. Dep. Interior Bur. Reclam. REC-ERC-84-23.* vi+104 p. 1984. SFA 30(3)
[Appl. Sci. Br., Div. Res. Lab. Serv., Eng. Res. Cent., Denver, CO]

85-002885 Lisle, T. E. ROUGHNESS ELEMENTS: A KEY RESOURCE TO IMPROVE ANADROMOUS FISH HABITAT. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 93-98. 1981. Available @ $7.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[U.S. For. Serv., Redwood Sci. Lab., Arcata, CA 95521] Methods to improve habitat for anadromous fish in stream channels of the Pacific Northwest must be cost-effective and cover a wide area. An effective strategy is to strengthen those conditions in a stream channel that locally favor a productive habitat. Adding more roughness elements--boulders, woody debris, or others--and manipulating those already present are suggested. Roughness elements change the distribution of hydraulic forces over a streambed, and, thereby, cause scour and the sorting of fine sediment from gravel. By providing a diversity of channel form and substrate conditions, roughness elements are a key resource to fish habitat.

85-002886 Michaelis, F. B. POSSIBLE EFFECTS OF FORESTRY ON INLAND WATERS OF TASMANIA: A REVIEW. *Bull. Environ. Contam. Toxicol.* 11(4):331-343. 1984. SFA 30(3)
[Aust. Natl. Parks Wildl. Serv., GPO Box 636, Canberra ACT 2601, Australia]

85-002887 Moyer, E. J. and V. P. Williams. EFFECTS OF LAKE BOTTOM CHANNELIZATION ON INVERTEBRATE FISH FOOD ORGANISMS IN LAKE TOHOPEKALIGA, FLORIDA. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:294-304. 1982. SFA 30(3)
[Fla. Game Fresh Water Fish Comm., 207 W. Carroll St., Kissimmee 32741] The relationship between the decline of macroinvertebrate standing crop and the loss of aquatic habitat due to box-cut access channel construction was assessed on Lake Tohopekaliga. Channelization of natural lake bottom had an adverse effect on benthic productivity by increasing both taxon richness and numbers of organisms routinely utilized by sportfish. For this study, channel substrate supported only 54% of the total standing crop of fish food organisms found in littoral substrate. Macroinvertebrates associated with vegetation were eliminated by the destruction of rooted macrophytes; approximately 420 fish food organisms were lost for every cubic meter of vegetated water column altered by channelization. It was estimated that an average standing crop of 840,000 fish food organisms would be lost due to the construction of a "standard" 200 X 10 X 2 m box-cut access channel.

85-002888 Platts, W. S. IMPAIRMENT, PROTECTION AND REHABILITATION OF PACIFIC SALMONID HABITATS ON SHEEP AND CATTLE RANGES. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 82-92. 1981.

HABITAT ALTERATIONS (CONTINUED)

85-002888 CONTINUED Available @ $7.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[U.S. For. Serv., Intermountain For. Range Exp. Stn., Boise, ID 83706]

85-002889 Reed, R. M. EFFECTS OF SMALL HYDROPOWER DEVELOPMENT ON RIPARIAN VEGETATION: PROBLEMS IN ASSESSING IMPACTS. *Bull. Ecol. Soc. Am.* 66(2):253. 1985. Abstract only. SFA 30(3)
[Oak Ridge Natl. Lab., Oak Ridge, TN]

85-002890 Satterthwaite, T. D. THE EFFECTS OF LOST CREEK DAM ON JUVENILE CHINOOK SALMON (*ONCORHYNCHUS TSHAWYTSCHA*) IN THE ROGUE RIVER, OREGON. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 122-130. 1981. Available @ $7.00 from Calif. Coop. Fish Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Oreg. Dep. Fish Wildl., Gold Beach 97444] The operation of Lost Creek Dam was projected to enhance salmonid populations in the Rogue River. In an ongoing study, biological parameters of juvenile chinook (*Oncorhynchus tshawytscha*) were assessed three years before and three years after the dam began operation. Emergence timing was accelerated in the post-impoundment period. Growth rates improved and were related to river temperature, discharge and juvenile abundance. Abundance decreased after the dam became operational and chinook salmon appeared to rear longer in the upper river prior to emigration. Results from studies of juvenile and adult salmonids will be used to recommend water release strategies for fisheries enhancement in the Rogue River.

85-002891 Seaman, W., Jr. ENHANCEMENT OF FLORIDA MARINE FISHERIES USING ARTIFICIAL REEFS: A REVIEW. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:312-322. 1982. SFA 30(3)
[Fla. Sea Grant Coll., Univ. Fla., Gainesville 32611]

85-002892 Sedell, J. R.; F. J. Swanson and S. V. Gregory. EVALUATING FISH RESPONSE TO WOODY DEBRIS. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 222-245. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[U.S. For. Serv., For. Sci. Lab., Corvallis, OR 97331] Fish respond favorably to debris in streams. Pristine streams contain vast amounts of of large wood in their channels and along their edges. For decades the principal tool for fish habitat management has been debris jam removal. We examine the evidence for evaluating the role coarse woody debris plays in the geomorphology of streams, specifically: logitudinal profiles, channel patterns and position, channel geometry, sediment organic matter storage, and channel dynamics. From this physical template we examine the fisheries implications of coarse woody debris (CWD): blockage to migration, water quality, and summer and winter rearing habitat. The issue of current management practices for providing wood inputs to stream is discussed in terms of the question how much wood is enough.

85-002893 Seehorn, M. E. FISH HABITAT IMPROVEMENT HANDBOOK. *U.S. For. Serv. South Reg. Tech. Publ.* R8-TPT. 21p. 1985. SFA 30(3)
[U.S.D.A. For. Serv., 1720 Peachtree Rd., N.W., Atlanta, GA 30367]

85-002894 Smith, A. K. and B. P. McPherson. THE EFFECTS OF LOST CREEK DAM ON DOWNSTREAM TEMPERATURES OF THE ROGUE RIVER, OREGON. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 131-140. 1981. Available @ $7.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Oreg. Dep. Fish Wildl., Corvallis 97331] Lost Creek Dam on the Rogue River, Oregon, (km 256) was expected to improve juvenile salmonid rearing conditions and reduce adult spring chinook (*Oncorhynchus tshawytscha*) mortality by augmenting summer flows with cooler water. An ongoing 12-year

HABITAT ALTERATIONS (CONTINUED)

85-002894 CONTINUED fishery study to evaluate impacts and develop operating criteria for the dam included experimental flow (51 and 67 m^3/s) and temperature (10 and 13°C) releases in summer to help determine operating strategies needed to provide temperatures and flows thought to be best for anadromous salmonid fisheries. Augmentation flows cooled the river by 1.8-2.1°C at the warmest point (km 48). The higher flow, higher temperature releases cooled daily maximum temperature by 0.5-0.8°C at km 97 and 0.3-1.2°C at km 140 compared to the lower flow, lower temperature release.

85-002895 Van Loan, J. OREGON'S STEP PROGRAM--PAST, PRESENT AND FUTURE. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 257-266. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)

[Steamboat Inn, Steamboat, OR 97447]

85-002896 Vanderlaan, S. R. THE FIRST ARTIFICIAL REEF IN GREAT LAKES: AN EVALUATION. *M.S. thesis, Mich. State Univ.* 127p. 1984. From Masters Abstr. 23(1):114. 1985. SFA 30(3)

[The Hamilton Reef was evaluated for fish reproduction and attraction using various gear types including SCUBA. SCUBA observations provided evidence of yellow perch spawning on the reef. Egg pumping, egg trays, emergent fry traps, and larval fish trawls provided no evidence that lake trout spawned on the reef. Analysis of gill netting data showed no reef attraction over a sand reference area for perch or other species. Emergent fry trap data showed a statistically larger number of fish utilized the shallow rather than the deep end of the reef. Reef light measurements indicate greater periphyton production at the shallow reef site which may cause this attraction. Light measurements and SCUBA observations on the reef disclose a low periphyton production potential because of its depth, nutrient availability, and small size. Comparison to the nearby Muskegon breakwall reveals a high periphyton production, nutrient availability, warmer water temperatures and large size that out competes the reef as a fish attractor.

85-002897 Wace, N. M. and M. W. Holdgate. MAN AND NATURE IN THE TRISTAN DA CUNHA ISLANDS. *Int. Union Conserv. Nat. Monogr.* No. 6. 114p. 1976. SFA 30(3)

85-002898 Ward, B. R. and P. A. Slaney. FURTHER EVALUATIONS OF STRUCTURES FOR THE IMPROVEMENT OF SALMONID REARING HABITAT IN COASTAL STREAMS IN BRITISH COLUMBIA. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 99-108. 1981. Available @ $7.00 from Calif. Coop. Fish Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)

[Minist. Environ., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada]

85-002899 West, J. P. ENHANCEMENT OF SALMON AND STEELHEAD SPAWNING AND REARING CONDITIONS IN THE SCOTT AND SALMON RIVERS, CALIFORNIA. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 117-127. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)

[Salmon River Ranger Dist., Klamath Natl. For., Etna 96027] Spawning gravels were manipulated at two sites on the Scott River using a tractor to improve egg incubation and fry emergence. This work reduced fine sediments about 18%. Use of treated areas rose from no use to approximately 29 redds per season in treated areas for a cost less than $1000. Boulder groups were placed in 4000 feet of South Fork Salmon River to improve salmonid spawning and rearing conditions for a cost of $43,000. Steelhead juvenile rearing increaed ten-fold. Salmon and steelhead spawner use increased three-fold. Use of control area remained relatively static.

HABITAT ALTERATIONS (CONTINUED)

85-002900 Wiley, R. W. EVALUATING SALMONID HABITATS AND FISH POPULATION RESPONSE TO ARTIFICIAL ENHANCEMENT. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 325-329. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Wyo. Game Fish Dep., Laramie 82070]

85-002901 Wilzbach, M. A. INFLUENCE OF RIPARIAN-RELATED HABITAT MANIPULATIONS ON INTERACTIONS BETWEEN CUTTHROAT TROUT AND INVERTEBRATE DRIFT. *Bull. Ecol. Soc. Am.* 66(2):295-296. 1985. Abstract only. SFA 30(3)
[Oreg. State Univ., Corvallis] Relative growth rates of cutthroat trout confined in pools were greater in a logged than in a forested section of stream. Differences in growth rates were attributed to differences among pools in invertebrate drift density, and to differences in trout foraging efficiency, that were related to the amount of overhead shading and substrate crevices. Mean percentages of prey capture by trout on introduced prey varying in size and density were greater in logged control pools and crevice-covered pools of both sections than in forested control pools and logged pools that were artificially shaded. Drift density significantly increased relative to controls in trout removal pools in the logged reach, but not in the forested section. This may result from habitat features in the logged section that favor greater trout foraging success and the occurrence of behaviorally drifting prey taxa which represent a predictable food source.

HARVEST, CREEL CENSUS, ETC.

85-002902 Green, A. W.; L. Z. Barrington and G. C. Matlock. AN ESTIMATION OF THE TOTAL NUMBER OF TEXAS FISHERMEN, 1 SEPTEMBER 1978 - 31 AUGUST 1979. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:241-251. 1982. SFA 30(3)
[Tex. Parks Wildl. Dep., Coastal Fish. Br., 4200 Smith School Rd., Austin 78744]

85-002903 Haxton, J. MOLALLA RIVER CATCHABLE TROUT FISHERY. *Oreg. Dep. Fish Wildl. Fish Div. Inf. Rep.* 85-4. 8p. 1985. SFA 30(3)
A selected portion of the Molalla River catchable trout fishery was evaluated from 21 May to 15 July 1983. During that period, an estimated 3,527 anglers harvested 2,764 hatchery rainbow, an overall return of 43%. Catchable trout comprised 89% of all species taken in the Molalla trout fishery.

85-002904 Hudgins, M. D. and S. P. Malvestuto. AN EVALUATION OF FACTORS AFFECTING CREEL CLERK PERFORMANCE. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:252-263. 1982. SFA 30(3)
[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36849]

85-002905 Jackson, R. V. ASSESSMENT OF THE SPORT FISHERY AT MARKLAND POOL AND TAILWATER OF THE OHIO RIVER. *Ky. Dep. Fish Wildl. Resour. Bull.* No. 75. 54p. 1985. SFA 30(3)
The fishery at Markland Pool of the Ohio River and its tailwater were surveyed from 1978 through 1984 as part of the Ohio River Sport Fishery Investigation Project. The fish population was surveyed utilizing rotenone, gill nets, and boat-mounted electrofishing gear. The game fish standing crop in the Markland Pool equaled or surpassed the standing crop found in many reservoirs in Kentucky. A comparison of electrofishing and gillnetting data between backwater and mainstem areas and between Markland Pool and other pools of the river strongly indicate the importance of backwater habitat to the fish production. Markland Pool has more backwater acreage than any other pool. A striped bass fishery has developed as a result of several years of stocking striped bass into the river. A tailwater creel survey indicated that the harvest goal of at least 1.0 pound per acre was surpassed. The species

HARVEST, CREEL CENSUS, ETC. (CONTINUED)

85-002905 CONTINUED representing the most pounds of fish creeled at Markland Pool was carp, follwed by channel catfish and freshwater drum. The exploitation rates for largemouth bass and white crappie were 29 and 27%, respectively. Both of these species showed very little movement between time of tagging and recapture and were generally recaptured in the same backwater in which they were tagged. The need for more fisherman access was apparent in the tailwater by the lack of a boat ramp near the area, low fishing pressure of 12.1 man-hours per acre, and a yield of only 7.8 pounds of fish per acre. The potential for fisheries improvement is greatest in the tailwater areas of the Ohio River. With good fishing access, Markland Pool tailwater should have a fish yield that is at least 10 times greater.

85-002906 Lent, R.; G. Whittaker and R. Johnston. THE ECONOMIC RESPONSE OF INCREASED SALMON LANDINGS. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 31-42. 1981. Available @ $7.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Oreg. State Univ., Corvallis 97331]

85-002907 Mullis, A. W. and C. R. Guier. SPORT FISHERY HARVEST AND EFFORT ON ALBEMARLE SOUND, NORTH CAROLINA. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:224-240. 1982. SFA 30(3)
[N.C. Wildl. Resour. Comm., 512 N. Salisbury St., Raleigh 27611]

85-002908 Roberts, K. J.; M. E. Thompson and P. W. Pawlyk. CONTINGENT VALUATION OF RECREATIONAL DIVING AT PETROLEUM RIGS, GULF OF MEXICO. *Trans. Am. Fish. Soc.* 114(2):214-219. 1985. SFA 30(3)
[Cent. Wetland Resour., La. State Univ., Baton Rouge 70803]

REGULATIONS

85-002909 Healey, M. C. INFLUENCE OF FISHERMAN'S PREFERENCES ON THE SUCCESS OF COMMERCIAL FISHERY MANAGEMENT REGIMES. *N. Am. J. Fish. Manage.* 5(2A):173-180. 1985. SFA 30(3)
[Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

85-002910 Serns, S. L. AN 8-INCH LENGTH LIMIT ON SMALLMOUTH BASS: EFFECTS ON THE SPORT FISHERIES AND POPULATIONS OF SMALLMOUTH BASS AND YELLOW PERCH IN NEBISH LAKE, WISCONSIN. *Wis. Dep. Nat. Resour. Tech. Bull.* No. 148. 24p. 1984. SFA 30(3)
[Dep. Nat. Resour., P.O. Box 7921, Madison, WI 53707] One of the more effective and most frequently used methods of regulating harvest to improve a fishery is the use of a minimum length limit. To determine the effects of of an 8-inch minimum length limit on smallmouth bass (*Micropterus dolomieui*) in Nebish Lake, Wisconsin, the sport fishery was studied for 5 years (1977-81) and contrasted to the previous 5-year period (1972-76) when there was no mimimum length limit. The sport fishery included smallmouth bass and yellow perch (*Perca flavescens*). Population characteristics of smallmouth bass and yellow perch were compared for the 4-year periods of 1974-77 (pre-length limit) v. 1978-81 (post-length limit), because the length limit imposed on 1 January 1977 would not have effected these parameters when measured in spring 1977. After the imposition of the 8-inch length limit on smallmouth bass in Nebish Lake, the following changes in the sport fishery occurred: 1) the average number of anglers per year was 33% higher. 2) the average number of hours fished per year was 27% higher. 3) the harvest (no.) of smallmouth bass was 8% lower, but the yield (lb) was 30% higher. 4) the mean length of smallmouth bass harvested

REGULATIONS (CONTINUED)

85-002910 CONTINUED increased from 8.2 inches to 9.4 inches. 5) the harvest rate of smallmouth bass declined 29% but the harvest rate of those ≥8.0 inches increased 27%. 6) the harvest, yield, and harvest rate of yellow perch all declined substantially. After the establishemnt of an 8-inch length limit on smallmouth bass in Nebish Lake, the following changes in population characteristics occurred: 1) the mean annual density and biomass of age III + smallmouth bass was 77% and 79% higher, respectively. 2) the production of fingerling smallmouth bass was 21% lower. 3) adult (ages III-V) smallmouth bass total annual mortality rates were slightly higher, because of higher rates of angler exploitation and possibly higher bass densities (increased intraspecific competition). 4) smallmouth bass growth increased slightly. 5) production of age III and IV smallmouth bass nearly doubled. 6) the mean annual density and biomass of adult yellow perch decreased substantially. 7) the angler exploitation rates of yellow perch increased, while the annual rates of total mortality decreased markedly. 8) yellow perch growth increased. With the 8-inch length limit in effect, the trade-off of 8% fewer bass in the creel was more than offset by the 30% increase in yield and the 1.2-inch increase in average length of bass creeled. An equilibrium yield model predicted that by increasing the entry level into the sport fishery from age III (8-inch length limit) to age IV (approximately an 11-inch length limit), yield would increase 5% and harvest would decrease by 45%, assuming no resultant changes in growth or natural mortality. To test this hypothesis, the Wisconsin Department of Natural Resources set the length limit at 10 inches beginning on 1 January 1982 and will monitor the fishery and populations of smallmouth bass and yellow perch through at least 1986.

MARKING AND TAGGING

85-002911 Busack, C. A SIMPLIFIED COLD-BRANDING APPARATUS. *Prog. Fish-Cult.* 47(2):127-128. 1985. SFA 30(3)
[Dep. Biol., Univ. Miss., University 38677]

85-002912 Crumpton, J. E. EFFECTS OF DUMMY RADIO TRANSMITTERS ON THE BEHAVIOR OF LARGEMOUTH BASS. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:351-357. 1982. SFA 30(3)
[Fla. Game Fresh Water Fish Comm., Eustis 32726]

85-002913 Fay, C. W. and G. B. Pardue. FREEZE BRANDS AND SUBMANDIBULAR LATEX INJECTIONS AS IDENTIFYING MARKS ON RAINBOW TROUT. *N. Am. J. Fish. Manage.* 5(2B):248-251. 1985. SFA 30(3)
[Box 642, Greenville, ME 04441]

85-002914 Higgins, P. J. X-RAY MICROTAGS FOR IDENTIFICATION OF INDIVIDUALS IN STUDIES OF FISH ENERGETICS. *J. Fish Biol.* 26(2):153-159. 1985. SFA 30(3)
[Freshwater Fish. Lab., Pitlochry, Scotland] In a study following growth and food intake of individuals within a population it was important to obtain individual rather than group mean measurements. A technique is described which combined the benefits of X-ray readable microtags with the radiographic method for measuring food intake described by Talbot & Higgins (1983). Its usefulness was established in an eight-month study on hatchery reared juvenile Atlantic salmon, *Salmo salar* L.

85-002915 Mellas, E. J. and J. M. Haynes. SWIMMING PERFORMANCE AND BEHAVIOR OF RAINBOW TROUT *(SALMO GAIRDNERI)* AND WHITE PERCH *(MORONE AMERICANA)*: EFFECTS OF ATTACHING TELEMETRY TRANSMITTERS. *Can. J. Fish.*

MARKING AND TAGGING (CONTINUED)

85-002915 CONTINUED *Aquatic Sci.* 42(3):488-493. 1985. In English with French summ. SFA 30(3)
[Dep. Biol. Sci., SUNY Coll., Brockport, NY 14420]

85-002916 Miles, M. S.; C. Talbot and J. E. Thorpe. READING X-RAY MICROTAGS. *J. Fish Biol.* 26(2):147-151. 1985. SFA 30(3)
[Freshwater Fish. Lab., Pitlochry, Scotland]

STOCKING AND INTRODUCTIONS

85-002917 Bell, D. E.; A. R. Jones and K. W. Prather. EVALUATION OF REDBREAST SUNFISH STOCKINGS IN KENTUCKY STREAMS. *Ky. Dep. Fish Wildl. Resour. Bull.* No. 75. 35p. 1985. SFA 30(3)

85-002918 Borkowski, W. K. and L. E. Snyder. EVALUATION OF WHITE BASS X STRIPED BASS HYBRIDS IN A HYPEREUTROPHIC FLORIDA LAKE. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:74-82. 1982. SFA 30(3)
[Fla. Game Freshwater Fish Comm., Ocala 32674]

85-002919 Boxrucker, J. FIRST YEAR GROWTH AND SURVIVAL OF STOCKED LARGEMOUTH BASS IN A SMALL OKLAHOMA IMPOUNDMENT. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:369-376. 1982. SFA 30(3)
[Okla. Fish. Res. Lab., 1416 Planck, Norman 73069] Liberty Lake was stocked with fingerling largemouth bass *(Micropterus salmoides)* at 448/ha in July, 1980. Monthly electrofishing samples collected for 1 year following stocking showed 76.4% of the 1980-year-class to have been stocked. A bimodal length distribution of stocked fish appeared in fall, 1980 and continued throughout the sampling period. Decreased survival of the stocked largemouth bass during the winter was noted. Most mortality occurred in the slower-growing fish. However, a decline in the number of fish from both length modes was evident.

85-002920 Buynak, G. L. APPLICATIONS OF LARGEMOUTH BASS REMEDIAL STOCKINGS IN SMALL IMPOUNDMENTS IN KENTUCKY. *Ky. Dep. Fish Wildl. Resour. Bull.* No. 73. 39p. 1985. SFA 30(3)
Largemouth bass were remedially stocked in three small impoundments in an attempt to improve the population structure of largemouth bass. This study was performed to determine where remedial stocking has application. Largemouth bass populations in Guist Creek and Fishpond lakes showed improvements as aresult of stocking. At Cannon Creek Lake, the stocking of large numbers of advanced fingerlings did little, if anything to improve the size structure of the bass population. Stocking of largemouth bass in an infertile (oligotrophic) lake, like at Cannon Creek Lake, does not appear to improve the black bass size structure. In these lakes, the stocking of smallmouth bass may be an appropriate management option if suitable coldwater habitat exists. If the management decision is not to establish a self-sustaining populatin of smallmouth bass because of lack of habitat or the lake is too small (approximately 100 acres or less), the lake may be fertilized to improve largemouth bass habitat followed by stockings of bass. This approach was effective at Fishpond Lake. In more fertile (mesotrophic and eutrophic) lakes where largemouth bass habitat is not limited, remedial stocking can improve the bass size structure, as occurred at Guist Creek Lake, if the problem causing the imbalance can not be corrected by methods other than stocking.

85-002921 De Groot, S. J. INTRODUCTIONS OF NON-INDIGENOUS FISH SPECIES FOR RELEASE AND CULTURE IN THE NETHERLANDS. *Aquaculture* 46(3):237-257. 1985. SFA 30(3)
[Neth. Inst. Fish. Invest., P.O. Box 68, 1970 AB IJmuiden, Netherlands]

STOCKING AND INTRODUCTIONS (CONTINUED)

85-002922 Dehring, T. R. and C. C. Krueger. A COMPUTER PROGRAM SYSTEM TO ALLOCATE THE ANNUAL STOCKING OF SALMONIDS IN THE WISCONSIN WATERS OF LAKE MICHIGAN. Wis. Dep. Nat. Resour. *Fish Manage. Rep.* No. 124. 80 p. 1985. SFAS 30(3)

[Bur. Fish Manage., Wis. Dep. Nat. Res., Madison] A system of computer programs is described that allocates the annual stocking of brook, brown and rainbow trout, and coho and chinook salmon in the Wisconsin waters of Lake Michigan. The program is written in Apple Pascal and operates on an Apple II+ or IIe microcomputer. The user enters data on the keyboard in response to questions by the program. Sociological, physical, and ecological parameters are used to compute (1) the recommended number and size of each species to stock by management zone, (2) the predicted catch by species and fishery within zones, and (3) the predicted costs involved in propagation and distribution of recommended stocking. Output is available on a video screen or in printed form.

85-002923 Ewing, R. D.; A. R. Hemmingsen; M. D. Evenson and R. L. Lindsay. GILL (Na^+K)-ATPASE ACTIVITY AND PLASMA THYROXINE CONCENTRATIONS DO NOT PREDICT TIME OF RELEASE OF HATCHERY COHO (*ONCORHYNCHUS KISUTCH*) AND CHINOOK SALMON (*ONCORHYNCHUS TSHAWYTSCHA*) FOR MAXIMUM ADULT RETURNS. *Aquaculture* 45(1-4):359-373. 1985. SFA 30(3)

[Oreg. Dept. Fish Wildl., 303 Extension Hall, Oreg. State Univ., Corvallis 97331] The time of cyclic changes in gill (Na^+K)-ATPase activity and plasma thyroxine (T_4) concentrations in coho (*Oncorhynchus kisutch*) and spring chinook (*O. tshawytscha*) salmon were compared with the time of release from hatcheries promoting maximal survival. In coho salmon from Big Creek reared in the laboratory, thyroxine reached a maximum concentration in April, and gill (Na^+K)-ATPase activities reached a maximum in May. Plasma thryoxine in coho salmon reared at Big Creek Hatchery had two peaks in concentration in April and mid-May. Only fish released in June had a peak in gill (Na^+K)-ATPase activity in mid-May. Coho salmon reared at Cascade Hatchery showed no cyclic changes in either plasma thyroxine or gill (Na^+K)-ATPase activity. Greatest returns from coho salmon released from Big Creek Hatchery and from Cascade Hatchery occurred from fish releaed in June. Juvenile spring chinook salmon reared at Cole Rivers Hatchery had peaks in gill (Na^+K)-ATPase activity in June or July, September, and November. In the same strain of fish reared in the laboratory gill (Na^+K)-ATPase activity reached a peak in October, and thyroxine concentration reached a maximum in November. Greatest adult returns occurred in fish released from Cole Rivers Hatchery in August. Spring chinook salmon reared at Round Butte Hatchery had variable peaks in gill (Na^+K)-ATPase activity, depending on the year and rearing conditions. The time of release providing greatest adult returns did not correlate well with peaks in gill (Na^+K)-ATPase activity. Results from these studies indicated that gill (Na^+K)-ATPase activity and plasma T_4 levels were poor predictors for release of juvenile coho and spring chinook salmon to produce maximal adult returns. The relationship of oceanic factors to survival of hatchery fish is discussed.

85-002924 Kucera, P. A.; D. L. Koch; and G. F. Marco. INTRODUCTIONS OF LAHONTAN CUTTHROAT TROUT INTO OMAK LAKE, WASHINGTON. *N. Am. J. Fish. Manage.* 5(2B):296-301. 1985. SFA 30(3)

[Nez Perce Tribe Fish. Resour. Manage., P.O. Box 365, Lapwai, ID 83540]

85-002925 Moss, J. L. and C. S. Lawson. EVALUATION OF STRIPED BASS AND HYBRID STRIPED BASS STOCKINGS IN EIGHT ALABAMA PUBLIC FISHING LAKES. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:33-41. 1982. SFA 30(2)

[Fish. Sect., Ala. Dep. Conserv. Nat. Resour., Montgomery 36130]

STOCKING AND INTRODUCTIONS (CONTINUED)

85-002926 Pardue, G. B. and K. B. Huntington. AN UNSUCCESSFUL ATTEMPT TO STOCK STRIPED BASS AS PREDATORS IN NEW AND UNBALANCED VIRGINIA FARM PONDS. *N. Am. J. Fish. Manage.* 5(2B):242-247. 1985. SFA 30(3)
[U. S. FWS, 18th and C St., N.W., Washington, DC 20240]

85-002927 Petrosky, C. E. COMPETITIVE EFECTS FROM STOCKED CATCHABLE-SIZE RAINBOW TROUT ON WILD TROUT POPULATION DYNAMICS. *Ph. D. dissertation, Univ. Idaho* 132p. 1984. From Diss. Abstr. Int. B Sci. Eng. 45(11):3386. 1985. SFA 30(3)
A three-year population study of wild rainbow trout, *Salmo gairdneri*, was conducted in stocked and unstocked sections of Big Springs Creek, a productive stream. Abundance, dispersal, mortality rate, growth rate, and condition factor of wild rainbow trout were not influenced measurably by stocking 50 or 100 catchable-size rainbow trout per section (135-m average length). At the highest stocking level (400 fish per section), only mortality rate of wild rainbow trout during summer was affected significantly. Hatchery rainbow trout abundance decreased more rapidly than wild trout abundance in Big Springs Creek sections. Summer and annual moratlity rates for hatchery trout exceeded those for wild trout, but extent of dispersal from sections, growth rate, and condition factor were similar. Only growth rate of hatchery trout was negatively related to number stocked. In a short-term study conducted in the infertile St. Joe River, abundance of wild cutthroat trout, *S. clarki*, remained stable for three weeks after stocking 50 of 150 catchable-size hatchery rainbow trout in test pools and runs (107-m average length). Cutthroat trout abundance declined moderatley in a single pool stocked with 500 catchable-size trout. Hatchery trout abundance declined rapidly. Most hatchery rainbow trout stocked in the St. Joe River selected habit not used by wild cutthroat trout. Where habitat use overlapped, introduced fish engaged in agonistic behavior with residents. Some hatchery rainbow trout entered the size-dominance hierarchy of wild cutthroat trout at feeding stations. Size determined the winner of agonistic encounters between wild cutthroat and hatchery rainbow trout. I have concluded that competition from catchable-size hatchery trout was not severe at low to moderate stocking densities. Apparently, wild trout were able to withstand presence of hatchery trout at low to moderate densities because niche overlap was incomplete and factors controlling abundance of older wild trout were not density-dependent. Competition between wild and hatchery trout, if present, may occur primarily near release sites.

85-002928 Rector, J. D. A STUDY OF THE EFFECTS OF TROUT STOCKING ON NATIVE FISHES OF LAUREL FORK OF STATION CAMP CREEK. *Tenn. Tech J.* 19:84. 1984. Abstract only. SFA 30(3)

85-002929 Slaney, P. A. and W. L. Harrower. EXPERIMENTAL CULTURE AND RELEASE OF STEELHEAD TROUT REARED IN NET-PENS AT O'CONNOR LAKE IN BRITISH COLUMBIA. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 43-51. 1981. Available @ $7.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Minist. Environ., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada]
The feasibility of culturing steelhead trout (*Salmo gairdneri*) in net-pens in lakes was assessed at O'Connor Lake on northern Vancouver Island. Also, growth from fry to smolt and smolt quality were examined in relation to rearing density, and migration to the ocean was studied after stocking smolts into the lower Keogh River. Juvenile steelhead grew to a size sufficient for release (range 55 to 64 g) after 10 months of rearing at a mean temperature of 10°C (range 3 to 20°C). The effect of rearing density (up to 0.09 smolts/l or 5.2 g/l, final) on growth was small, but abrasion of fins was more density dependent. Seaward migration of four groups of smolts weighing 41, 55, 64 (1 year of rearing) and 105 g (2 years of rearing) was 79, 91, 93 and 68 percent in the first year, respectively. A significant percent (7%) of the 41 g group migrated in a second year, but additional migration of the 55 g group was negligible. Population surveys in the river demonstrated that losses were only in part attributable to motality. Densities of cultured smolts, which reverted to residual parr, were similar to wild steelhead parr, and four

STOCKING AND INTRODUCTIONS (CONTINUED)

85-002929 CONTINUED times the latter in standing crop. Sex of residuals was highly biased to males, and 26 percent of the residuals were resident beyond a second spring. While failure to migrate contributes to the typically low survival rate of cultured steelhead smolts, a greater management implication is that production of wild smolts is to some extent impaired, and at least in smaller rivers managed for both wild and cultured stocks, stocking should be restricted to the lowest reach.

85-002930 Soivio, A. and E. Virtanen. THE QUALITY AND CONDITION OF REARED *SALMO SALAR* SMOLTS IN RELATION TO THEIR ADULT RECAPTURE RATE. *Aquaculture* 45(1-4):335-343. 1985. SFA 30(3)
[Dep. Zool., Univ. Helsinki, Arkadiankatu 7, SF-00100 Helsinki, Finland] Physiological parameters (haematocrit value (Hct) and haemoglobin (Hb), plasma glucose, lactate and electrolyte concentrations together with tissue energy store) were used to judge the quality and condition of young Atlantic salmon in several fish farms just prior to release in 1981. Based on the current knowledge of the physiology of parr-smolt transformation and data on natural smolts, we have been able to classify the reared fish from different farms in Finland. The results of this classification have been related to the adult recapture rate.

85-002931 Spinelli, A. J.; B. G. Whiteside and D. G. Huffman. AQUARIUM STUDIES ON THE EVALUATION OF STOCKING VARIOUS SIZES OF CHANNEL CATFISH WITH ESTABLISHED LARGEMOUTH BASS. *N. Am. J. Fish. Manage.* 5(2A):138-145. 1985. SFA 30(3)
[Aquatic Sect., Southwest Tex. State Univ., San Marcos 78666]

FISHING GEAR AND TECHNIQUES

85-002932 Amagai, K. and R. Kawashima. [DYNAMICAL RESPONSE CHARACTERISTIC OF WARP TENSION AND SHIP'S MOTIONS WHILE TOWING A TRAWL NET.] *Bull. Jpn. Soc. Sci. Fish.* 51(2):167-174. 1985. In Japanese with English summ. SFA 30(3)
[Fac. Fish., Hokkaido Univ., Minato-3, Hakodate 041, Japan]

85-002933 Arimoto, T.; J. Park and M. Inoue. [REACTION OF UGUI, *TRIBOLODON HAKONENSIS*, TOWARD THE MOVING NET. *J. Tokyo Univ. Fish.* 71(2):81-89. 1984. In Japanese with English summ. SFA 30(3)
[Lab. Fish. Methodol., Tokyo Univ. Fish., 5-7, Konan 4, Minato-ku, Tokyo 108, Japan]

85-002934 Clarke, M. R. and P. L. Pascoe. THE INFLUENCE OF AN ELECTRIC LIGHT ON THE CAPTURE OF DEEP-SEA ANIMALS BY A MIDWATER TRAWL. *J. Mar. Biol. Assoc. U.K.* 65(2):373-393. 1985. SFA 30(3)
[The Lab., Mar. Biol. Assoc., Citadell Hill, Plymouth PL1 2PB, England]

85-002935 Eyres, D. J. FISHING BOAT DESIGNS: 4. SMALL STEEL FISHING BOATS. *FAO Fish. Tech. Pap.* 239. vi+33p. 1984. SFA 30(3)
[c/o Mar. Div., Minist. Transport, P. B., Wellington, No. 2, New Zealand]

85-002936 Hosford, W. E. and S. P. Pribyl. RAFT MOUNTED ELECTROFISHING FRAME. *Oreg. Dep. Fish Wildl. Fish Div. Inf. Rep.* 85-3. 8p. 1985. SFA 30(3)

FISHING GEAR AND TECHNIQUES (CONTINUED)

85-002936 CONTINUED
A metal frame was designed and built that allows a rubber raft to function as a light weight, portable electrofishing unit for midsized streams. Frame assembly, equipment box construction, and electrode detail is described.

85-002937 Kanehiro, H.; M. Suzuki and K. Matuda. [FATIGUE RESISTANCE OF TUNA LONG LINE.] *J. Tokyo Univ. Fish.* 69(2):109-116. 1983. In Japanese with English summ. SFA 30(3)
[Lab. Fishing Gear, Tokyo Univ. Fish., 5-7, Konan 4, Minato-ku, Tokyo 108, Japan]

85-002938 Kanehiro, H.; M. Suzuki and K. Matuda. [DURABILITY OF TUNA LONG LINE AGAINST CYCLIC LOADING.] *J. Tokyo Univ. Fish.* 69(2):97-108. 1983. In Japanese with English summ. SFA 30(3)
[Lab. Fishing Gear, Tokyo Univ. Fish., 5-7, Konan 4, Minato-ku, Tokyo 108, Japan]

85-002939 La Bolle, L. D., Jr.; H. W. Li and B. C. Mundy. COMPARISON OF TWO SAMPLERS FOR QUANTITATIVELY COLLECTING LARVAL FISHES IN UPPER LITTORAL HABITATS. *J. Fish Biol.* 26(2):139-146. 1985. SFA 30(3)
[Oreg. Coop. Fish. Res. Unit, Oreg. State Univ., Corvallis 97331] Performance of two larval fish samplers, a hand-towed net and a dropbox enclosure, was similar when tested in shallow (mean water depth, 20 cm) upper littoral-zone habitats. There was no significant difference between means of larval fish density (by total catch and by species) estimated from the catch in each gear, during the day and at night. Mean lengths of larvae (total catch) from the tow net was significantly longer than that from the dropbox during the day, but mean length did not differ between gear at night. Mean lengths of larvae of each species between gear were not significantly different within each period. Both gears collected significantly longer larvae (total catch and by species) during the day than at night probably because of diel movements of larvae of different sizes and species.

85-002940 Madenjian, C. P. and D. J. Jude. COMPARISON OF SLEDS VERSUS PLANKTON NETS FOR SAMPLING FISH LARVAE AND EGGS. *Hydrobiologia* 124(3):275-281. 1985. SFA (30)3
[Great Lakes Res. Div., Univ. Mich., Ann Arbor 48109]

85-002941 Parrish, D. L.; T. D. Forsythe and T. J. Timmons. ELECTROFISHING VS. ANGLER HARVEST: DIFFERENCES IN LENGTH-FREQUENCY DISTRIBUTIONS. *Trans. Ky. Acad. Sci.* 46(1-2):57. 1985. SFA 30(3)
[Ohio Coop. Fish. Res. Unit, 1735 Neil Ave., Columbus 43210]

85-002942 Purvis, H. A.; C. L. Chudy; E. L. King, Jr. and V. K. Dawson. RESPONSE OF SPAWNING-PHASE SEA LAMPREYS (*PETROMYZON MARINUS*) TO A LIGHTED TRAP. *Great Lakes Fish. Comm. Tech. Rep.* No. 42. p. 15-25. 1985. SAF 30(3)
[U.S., Marquette Biol. Stn., Marquette, MI 49855] The response of upstream migrating adult sea lampreys (*Petromyzon marinus*) to light was tested in a two-compartment trap. Illuminated traps collected about five times as many sea lampreys (5,766 of 6,983, or 83%) as did dark traps; the difference was highly significant ($P < 0.01$). Comparisons between catches when both traps were either lit or dark as well as when one was lit and the other dark, showed that illuminated traps caught significantly more lampreys ($P < 0.05$). The position of the trap in relation to the river bank also affected the catch of sea lampreys; trap 1 which was farthest from the bank captured 85% (5,919) of the sea lampreys. Although sea lampreys responded strongly to trap position, this response was

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85-002942 CONTINUED modified by selected lighting arrangements. Illumination of traps could play a prominent role in the assessment and control of sea lampreys under a program of integrated sea lamprey management.

85-002943 Steward, P. A. M. and R. S. T. Ferro. MEASUREMENTS ON GILL NETS IN A FLUME TANK. *Fish. Res.* 3(1):29-46. 1985. SFA 30(3)
[Mar. Lab., Aberdeen, Scotland]

85-002944 Tang, Y. and K. Kanda. [EXPERIMENTS IN EFFECTIVITY OF A OFF-BOTTOM OTTER TRAWL. II. POSSIBLITY OF THE OFF-BOTTOM TRAWL IN ITS APPLICATION TO THE STANDARD BOTTOM TRAWL IN A COMBINATION USE.] *J. Tokyo Univ. Fish.* 69(1):57-65. 1982. In Japanese with English summ. SFA 30(3)
[Lab. Fish. Technol., Tokyo Univ. Fish., Minato-ku, Tokyo 108, Japan]

85-002945 Tang, Y. and Kanda, K. [EXPERIMENTS IN EFFECTIVITY OF A OFF-BOTTOM OTTER TRAWL. I. COMPARISON BETWEEN FULL SCALE AND MODEL NETS.] *J. Tokyo Univ. Fish.* 69(1):49-55. 1982. In Japanese with English summ. SFA 30(3)
[Lab. Fish. Technol., Tokyo Univ. Fish., Minato-ku, Tokyo 108, Japan]

85-002946 Willis, D. W.; K. D. McCloskey and D. W. Gabelhouse, Jr. CALCULATION OF STOCK DENSITY INDICES BASED ON ADJUSTMENTS FOR EFFICIENCY OF GILL-NET MESH SIZE. *N. Am. J. Fish. Manage.* 5(2A):126-137. 1985. SFA 30(3)
[Kans. Fish Game Comm., P.O. Box 1525, Emporia 66801]

FERTILIZATION OF SOIL AND WATER

85-002947 Boyd, C. E. and W. D. Hollerman. INFLUENCE OF PARTICLE SIZE OF AGRICULTURAL LIMESTONE ON POND LIMING. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:196-201. 1982. SFA 30(3)
[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36849]

85-002948 Pillai, V. K. and C. E. Boyd. A SIMPLE METHOD FOR CALCULATING LIMING RATES FOR FISH PONDS. *Aquaculture* 46(2):157-162. 1985. SFA 30(3)
[Cent. Mar. Fish. Res. Inst., P.B. No. 1912, Cochin 682018, India] The pH change in 40 ml of buffer caused by 20 g dry soil may be multiplied by 5600 to provide the lime requirement of mud in a fish pond. The buffer contains 10 g p-nitrophenol, 7.5 g boric acid, 37 g potassium chloride, and 5.25 g potassium hydroxide dissolved and diluted to 1000 ml with distilled water; the buffer pH is adjusted to 8.00.

85-002949 Stockner, J. G. and K. S. Shortreed. WHOLE-LAKE FERTILIZATION EXPERIMENTS IN COASTAL BRITISH COLUMBIA LAKES: EMPIRICAL RELATIONSHIPS BETWEEN NUTRIENT INPUTS AND PHYTOPLANKTON BIOMASS AND PRODUCTION. *Can. J. Fish. Aquatic Sci.* 42(4):649-658. 1985. In English with French summ. SFA 30(3)
[Dep. Fish. Oceans, 4160 Marine Drive, West Vancouver, BC V7V 1N6, Canada]

FISHWAYS, FISH PASSAGE THROUGH DAMS, ETC.

85-002950 Beach, M. H. FISH PASS DESIGN--CRITERIA FOR THE DESIGN AND APPROVAL OF FISH PASSES AND OTHER STRUCTURES TO FACILITATE THE PASSAGE OF MIGRATORY FISH IN RIVERS. *Fish. Res. Tech. Rep. (Lowestoft)* No. 78. 46p. 1984. SFA 30(3)
[Fish. Lab., Lowestoft, UK]

85-002951 Hunter, R. G. THE ROLE OF PRIVATE ORGANIZATIONS IN FISH PASSAGE: A CASE HISTORY. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 79-80. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[1175 E. Main St., Medford, OR 97503]

85-002952 Taylor, R. E. and B. Kynard. MORTALITY OF JUVENILE AMERICAN SHAD AND BLUEBACK HERRING PASSED THROUGH A LOW-HEAD KAPLAN HYDROELECTRIC TURBINE. *Trans. Am. Fish. Soc.* 114(3):430-435. 1985. SFA 30(3)
[Mass. Coop. Fish. Res. Unit, Univ. Mass., 204 Holdsworth Hall, Amherst 01003]

MATHEMATICS, STATISTICAL METHODS, AND MODELING

85-002953 Bartoo, N. and T. Shiohama. A PRODUCTION MODEL ANALYSIS OF THE NORTH PACIFIC ALBACORE POPULATION INCLUDING ESTIMATES OF THE SENSITIVITY OF RESULTS TO MEASUREMENT ERRORS IN INPUT DATA. *Bull. Far Seas Fish. Res. Lab.* 22: 109-117. 1985. In English with Japanese summ. SFA 30(3)
[Southwest. Fish. Cent., La Jolla Lab., La Jolla, CA 92038]

85-002954 Blewett, E. SALMONID HABITAT EVALUATION MODEL. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 301-324. 1984. Available @ $10.00 from Calif Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95221. SFA 30(3)
[Dep. Fish. Oceans, Vancouver, BC V6E 2P1, Canada]

85-002955 Botsford, L. W. and T. C. Wainwright. OPTIMAL FISHERY POLICY: AN EQUILIBRIUM SOLUTION WITH IRREVERSIBLE INVESTMENT. *J. Math. Biol.* 21(3):317-327. 1985. SFA 30(3)
[Dep. Wildl. Fish. Biol., Univ. Calif., Davis 95616] Optimal fishery policy has been derived using several different models of varying biological realism. Policy has either been assumed to be non-time-varying and static optimization techniques have been applied or dynamic techniques have been used and have in some cases resulted in constant policy. Botsford (1981) showed by applying dynamic optimization techniques to several biologically realistic models (i.e. models that included size structure and either density or food dependent growth and recruitment rates) that the constant policy solution found for simpler, less realistic models was not possible. He concluded that optimal policy was a time-varying, possibly pulse-fishing policy. We show here that when the maximum allowed fishing mortality is low enough a different kind of constant policy is optimal for these realistic models. Interpretation of this condition requires explicit consideration of fixed capital costs in addition to operating costs. Practical considerations indicate that this constant policy would apply only to fisheries with high fixed capital costs.

MATHEMATICS, STATISTICAL METHODS, AND MODELING (CONTINUED)

85-002956 Charles, A. T. and W. J. Reed. A BIOECONOMIC ANALYSIS OF SEQUENTIAL FISHERIES: COMPETITION, COEXISTENCE, AND OPTIMAL HARVEST ALLOCATION BETWEEN INSHORE AND OFFSHORE FLEETS. *Can. J. Fish. Aquatic Sci.* 42(5):952-962. 1985. In English with French summ. SFA 30(3)
[Dep. Fish. Oceans, 1090 West Pender St., Vancouver, BC V6E 2P1, Canada]

85-002957 Chien, Y. and R. E. Condrey. A MODIFICATION OF THE DELURY METHOD FOR USE WHEN NATURAL MORTALITY IS NOT NEGLIGIBLE. *Fish. Res.* 3(1):23-28. 1985. SFA 30(3)
[Dep. Aquacult., Natl. Taiwan Coll. Mar. Sci. Technol., Keelung, Taiwan, ROC]

85-002958 Colgan, P. W. and J. T. Smith. EXPERIMENTAL ANALYSIS OF FOOD PREFERENCE TRANSITIVITY IN FISH. *Biometrics* 41(1):227-236. 1985. SFA 30(3)
[Dep. Biol., Queen's Univ., Kingston, ON K7L 3N6, Canada]

85-002959 Cui, Q. and Lu, F. A MATHEMATICAL MODEL OF PREDATION BASED UPON THE THEROY OF NUTRITION KINETICS. *Ecol. Model.* 28(1-2):155-164. 1985. SFA 30(3)
[Inst. For. Pedol., Acad. Sin., Shenyang, China] Using the theory of nutrition kinetics, this paper describes a simple new mathematical model of a predator-prey system, that can be reduced to three well-known predation models under some special conditions. A new parameter, termed "predation efficiency", can express the relationship between a predator's capture of food and its metabolic expenditure, i.e. the efficiency of prey utilization by a predator; this value can obviously affect the location of the theoretical equilibrium point and the oscillatory behaviour of a coexisting system.

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MATHEMATICS, STATISTICAL METHODS, AND MODELING (CONTINUED)

85-002964 CONTINUED and results are compared to observations. It is found that the model predicitons are fairly close after the 1st year but diverge from observations at several stations after the 2nd year. It is suggested that this divergence is due to the adaptation of the populations to new spawning areas, a factor not yet considered in the model. Future directions for development of the model are discussed.

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[Finn. Game Fish Res. Inst., Fish. Div., PB 193, SF-00131 Helsinki, Finland] Finnish pike-perch lakes, classified on the origin and abundance of their pike-perch stocks, were studied in regard to surface area, average total phosphorus concentration and average colour value. A non-parametric statistical test was applied. It seemed that introduction has succeeded better in lakes with higher phosphorous concentrations. Although natural stocks occur chiefly in larger lakes, introduction appears to have been more successful in small than in large lakes. Natural pike-perch stocks live in all types of lakes, but eutrophic waters are evidently more suitable than others.

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85-002989 Van der Waal, B. C. W. ASPECTS OF THE BIOLOGY OF LARGER FISH SPECIES OF LAKE LIAMBEZI, CAPRIVI, SOUTH WEST AFRICA. *Madoqua* 14(2):101-144. 1985. SFA 30(3)
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RIVER AND STREAM MANAGEMENT AND RESEARCH

85-002990 Anderson, J. W.; R. A. Ruediger and W. F. Hudson, Jr. DESIGN, PLACEMENT AND FISH USE OF INSTREAM STRUCTURES IN SOUTHWESTERN OREGON. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 165-180. 1984. Available

RIVER AND STREAM MANAGEMENT AND RESEARCH (CONTINUED)

85-002990 CONTINUED @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[BLM, Coos Bay, OR 97420] Protection and enhancement of wild fish habitat for salmonids prompted the investment in artificial stream structures on lands administered by the Bureau of Land Management. Streams with known habitat deficiencies were selected and project reaches were identified based on access, stream width and gradient. Ten enhancement designs were developed and 80 artificial structures were installed on 4 streams during 1981-1982. Three of these designs; the diagonal, "V" and "Y", proved to be the most stable, easiest to build and provided good habitat characteristics. Anadromous salmonids extensively utilized the structures as both juveniles and adults. Based on square meters of habitat created it is possible to estimate the potential rearing utilization by species and age group.

85-002991 Bachen, B. A. DEVELOPMENT OF SALMONID SPAWNING AND REARING HABITAT WITH GROUNDWATER-FED CHANNELS. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 51-62. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[North. Southeast Reg. Aquacult. Assoc., P.O. Box 2606, Sitka, AK 99835]

85-002992 Bingham, N. SALMON RESTORATION IN MENDOCINO COUNTY. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 155-157. 1981. Available @ $7.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Salmon Restoration Assoc. Calif., Inc., Fort Bragg, CA 95437]

85-002993 Blackette, R. F. ESTABLISHMENT OF SOCKEYE (*ONCORHYNCHUS NERKA*) AND CHINOOK (*O. TSHAWYTSCHA*) SALMON RUNS AT FRAZER LAKE, KODIAK ISLAND, ALASKA. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 115-121. 1981. Available @ $7.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Alaska Dep. Fish. Game, Kodiak 99615]

85-002994 Brouha, C. STREAM PROTECTION ON PUBLIC RANGELANDS: AN UPHILL FIGHT. *Fisheries (Bull. Am. Fish. Soc.)* 10(2):20. 1985. SFA 30(3)

85-002995 Buer, K. Y.; J. N. Eaves; R. G. Scott and J. R. McMillan. BASIN CHANGES AFFECTING SALMON HABITAT IN THE SACRAMENTO RIVER. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 14-50. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Calif. Dep. Water Resour., Red Bluff 96080]

85-002996 Buer, K.; R. Scott; D. Parfitt; G. Serr; J. Haney and L. Thompson. SALMON SPAWNING GRAVEL ENHANCEMENT STUDIES ON NORTHERN CALIFORNIA RIVERS. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 149-154. 1981. Available @ $7.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Calif. Dep. Water Resour., Red Bluff, CA 96080]

85-002997 Cross, D. RESTORATION OF AN EPHEMERAL STREAM DRY CREEK, TRIBUTARY TO THE KLAMATH RIVER. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 141-143. 1981. Available @ $7.00 from Calif. Coop. Fish Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[U.S. BLM, Redding, CA 96001] In 1977, eight gabion weirs were constructed

RIVER AND STREAM MANAGEMENT AND RESEARCH (CONTINUED)

85-002997 CONTINUED in Dry Creek, an ephemeral tributary to the Klamath River, to improve spawning habitat for wild steelhead trout (*Salmo gairdneri*). Although successful in flattening stream gradient and reducing the loss of spawning gravels, utilization of the spawning areas by adult fish was limited. Modification of the riffles will hopefully increase utilization and subsequent production of wild steelhead fry.

85-002998 Doyle, J. E. HABITAT ENHANCEMENT ON OFF-CHANNELS AND TERRACED TRIBUTARIES IN PUGET SOUND RIVER SYSTEMS. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 81-96. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)

[USFS, Seattle, WA] Some of the most important anadromous fish production areas existing in our Pacific Northwest costal river basins are "off-channel" and "terraced tributaries". These special aquatic habitats have resulted from both natural and man-influenced events. With both of these events occurring over time, opportunities have developed that show it to be economical and biologically feasible to rehabiliate and/or enhance these aquatic habitats. The Mt. Baker-Snoqualmie National Forest, located in the Puget Sound area of Washington, has been identifying and developing such opportunities on river basins since 1981. Over 300 structures or sites have been treated and to-date, 90% (270) of these structures are in-place with 75% (200) of these accomplishing the project objectives. Rearing habitat quality and quanitity has been increased for coho salmon, steelhead trout, and chinook salmon. Actual increase in fish numbers or biomass has been observed but not measured. Use of these enhanced areas as protected over-wintering areas and during summer low flow periods by juveniles has been observed. The importance and role of large woody debris in these habitats cannot be over emphasized.

85-002999 Everest, F. H. and J. R. Sedell. EVALUATING EFFECTIVENESS OF STREAM ENHANCEMENT PROJECTS. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 246-256. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcatta 95521. SFA 30(3)

[U.S. For. Serv., For. Sci. Lab., Corvallis, OR 97331]

85-003000 Glova, G. J. and M. J. Duncan. POTENTIAL EFFECTS OF REDUCED FLOWS ON FISH HABITATS IN A LARGE BRAIDED RIVER, NEW ZEALAND. *Trans. Am. Fish. Soc.* 114(2):165-181. 1985. SFA 30(3)

[Fish. Res. Div., P.O. Box 8324, Riccarton, Christchurch, New Zealand]

85-003001 Hashagen, K. A. THE SOCIAL AND POLITICAL RAMIFICATIONS OF STREAM REHABILITATION: THE CALIFORNIA PERSPECTIVE. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 267-272. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)

[Calif. Dep. Fish. Game, 1416 Ninth St., Sacramento 95814]

85-003002 House, R. EVALUATION OF IMPROVEMENT TECHNQUES FOR SALMONID SPAWNING. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 5-13. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)

[BLM, Salem, OR 97302] Spawning habitat restoration techniques conducted over the last six years on North Pacific coastal streams have shown dramatic results in creating excellent spawning areas for anadromous salmonids. On East Fork Lobster and Tobe Creeks, Alsea River, Oregon, gabion structures increased the useable spawning area, trapping an average of 15.9 m^2 and 8.3 m^2, respectively, of high quality gravels at each structure. Most treated areas showed a disproportionately high use by spawning salmonids compared to untreated areas.

RIVER AND STREAM MANAGEMENT AND RESEARCH (CONTINUED)

85-003003 Keup, L. E. FLOWING WATER RESOURCES. *Water Resour. Bull.* 21(2):291-296. 1985. Available from U.S. Fish Wildl. Serv., WELUT, Instream Flow Group, 2627 Redwing Rd., Fort Collins, CO 80526. SFA 30(3) Using data related to stream order and the morphological characteristics associated with streams of different discharge rates, an estimate of the of the river resources of the United States is made. The national totals are: 3,200,000 miles total length of rivers; 15,000 square miles of river of river surface; and 29 cubic miles of water stored in river channels. Using the same techniques, more exact estimates may be made for individual river basins. Suggestions are given for application of the techniques and river data in the management of water resources.

85-003004 Koski, K. V.; J. Heifetz; S. Johnson; M. Murphy and J. Thedinga. EVALUATION OF BUFFER STRIPS FOR PROTECTION OF SALMONID REARING HABITAT AND IMPLICATIONS FOR ENHANCEMENT. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 138-155. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[NMFS, P.O. Box 210155, Auke Bay, AK 99821]

85-003005 Krebb, M. STREAM RESTORATION AND ENHANCEMENT BY CALIFORNIA CONSERVATION CORPS. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 77-78. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Calif. Conserv. Corps, Weott, CA 95571]

85-003006 Minshall, G. W.; K. W. Cummins; R. C. Petersen; C. E. Cushing; D. A. Bruns; J. R. Sedell and R. L. Vannote. DEVELOPMENTS IN STREAM ECOSYSTEM THEORY. *Can. J. Fish. Aquatic Sci.* 42(5):1045-1055. 1985. In English with French summ. SFA 30(3)
[Dep. Biol., Idaho State Univ., Pocatello 83209]

85-003007 Moreau, J. K. ANADROMOUS SALMONID ENHANCEMENT. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 97-116. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[U.S. For. Serv., P.O. Box 228, Gasquet, CA 95543] Boulder wing deflectors, clusters, and weirs were placed in Hurdygurdy Creek, tributary to the South Fork Smith River in northwestern California, to increase rearing and spawning habitat for steelhead trout and chinook salmon. Since 1981 approximately 1.3 km of the lower 6.2 km have been treated. Population estimates for steelhead parr increased by 100% two years after placement of boulder structures in one stream section while population estimates in the two control sections declined by 56% and 61%. Large areas of spawning gravel were created by two boulder weirs placed at the tails of pools. Increases in both steelhead parr habitat gravel spawning areas were attained in one section by alternating wing deflectors on opposite banks and placing boulder clusters in the center of the channel. Project costs have ranged from $41 to $77 per cubic meter of boulder in place.

85-003008 Overton, C. K. EVALUATION OF STREAM CHANNEL ENHANCEMENT NEEDS. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 156-164. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Six Rivers Natl. For., Eureka, CA 95501]

RIVER AND STREAM MANAGEMENT AND RESEARCH (CONTINUED)

85-003009 Overton, K.; W. Brock; J. Moreau and J. Boberg. RESTORATION AND ENHANCEMENT PROGRAM OF ANADROMOUS FISH HABITAT AND POPULATIONS ON SIX RIVERS NATIONAL FOREST. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 158-168. 1981. Available @ $7.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Six Rivers Natl. For., Eureka, CA 95501]

85-003010 Parfitt, D. and K. Buer. CHINOOK SALMON-SPAWNING ENHANCEMENT POTENTIAL IN THE UPPER SACRAMENTO RIVER. *Proc. Propagation Enhancement Rehab. Anadromous Salmonid Popul. Habitat Symp.* p. 144-148. 1981. Available @ $7.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Calif. Dep. Water Resour., Red Bluff, CA 96080] The development of side-channel spawning enhancement sites in the Sacramento River between Keswick Dam and Red Bluff, California, is believed to be the only viable alternative for increasing spawning habitat in the river's floodway. The California Department of Water Resources has identified 29 potential sites that, if fully developed, could accommodate up to 44,000 pairs of salmon each year. The sites are being surveyed and designed, with construction to begin in 1982. Design specifications will include sized spawning gravel, adequate flow velocities, depths, and hydraulic diversity to provide habitat suited for successful spawning, egg incubation, and rearing.

85-003011 Platts, W. S. and J. N. Rinne. RIPARIAN AND STREAM ENHANCEMENT MANAGEMENT AND RESEARCH IN THE ROCKY MOUNTAINS. *N. Am. J. Fish. Manage.* 5(2A):115-125. 1985. SFA 30(3)
[U.S. For. Serv., Intermountain For. Range Exp. Stn., Boise, ID 83702]

85-003012 Platts, W. S. DETERMINING AND EVALUATING RIPARIAN-STREAM ENHANCEMENT NEEDS AND FISH RESPONSE. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 181-190. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit., Humboldt State Univ., Arcata 95521. SFA 30(3)
[U.S. For. Serv., 316 East Myrtle St., Boise, ID 83702]

85-003013 Pratt, J.; J. Garcia and S. Orloff. STREAM CORRIDOR INVENTORY AND EVALUATION SYSTEMS (SCIES). *Bull. Ecol. Soc. Am.* 66(2):251. 1985. Abstract only. SFA 30(3)
[BioSystems Analysis, Inc., Sausalito, CA]

85-003014 Reichard, N. RIPARIAN HABITAT RESTORATION: SOME TECHNIQUES FOR DEALING WITH LANDOWNERS, LIVESTOCK, AND ERODING STREAMBANKS. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 128-137. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Redwood Commun. Action Agency, Eureka, CA 95501]

85-003015 Rickel, B. THE REHABILITATION AND ENHANCEMENT OF A UNIQUE RUN OF CHUM SALMON (*ONCORHYNCHUS KETA*) IN FISH AND MARX CREEKS, HYDER, ALASKA. *Proc. Pac. Northwest Stream Habitat Manage. Workshop* p. 63-76. 1984. Available @ $10.00 from Calif. Coop. Fish. Res. Unit, Humboldt State Univ., Arcata 95521. SFA 30(3)
[Ketchikan Ranger Dist., P.O. Box 6137, Ketchikan, AK 99901]

85-003016 Smith, N. J. H. THE IMPACT OF CULTURAL AND ECOLOGICAL CHANGE ON AMAZONIAN FISHERIES. *Biol. Conserv.* 32(4):355-373. 1985. SFA 30(3)
[Dep. Geogr., Univ. Fla., Gainesville 32611] Fish have long provided an important item in the diet of Amazonians, but ecological and cultural changes threaten the long-term productivity of aquatic ecosystems. Population growth, the opening of extra-regional markets and the introduction of new or improved

RIVER AND STREAM MANAGEMENT AND RESEARCH (CONTINUED)

85-003016 CONTINUED technologies, have increased pressure on fisheries of Amazonia, the world's largest freshwater catchment. Habitat destruction due to agricultural expansion and development projects also threatens to undermine fishing yields. Modern conservation practices, such as the establishment of parks and reserves and the enactment of protective legislation, are only gaining a tentative foothold in the region.

85-003017 Statzner, B. and B. Higler. QUESTIONS AND COMMENTS ON THE RIVER CONTINUUM CONCEPT. *Can. J. Fish. Aquatic Sci.* 42(5):1038-1044. 1985. In English with French summ. SFA 30(3)
[Zool. Inst. Univ., Postfach 6380, D-7500 Karlsruhe, West Germany]

FARM POND AND SMALL IMPOUNDMENT MANAGEMENT AND RESEARCH

85-003018 Blay, J., Jr. OBSERVATIONS ON THE BALANCE IN FISH POPULATIONS IN A SMALL RESERVOIR IN GHANA. *Fish. Res.* 3(1):1-11. 1985. SFA 30(3)
[Dep. Biol. Sci., Univ. Ilorin, Ilorin, Nigeria]

85-003019 Brunson, M. W. and H. R. Robinette. SUPPLEMENTAL WINTER FEEDING OF HYBRID SUNFISH IN MISSISSIPPI. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:157-161. 1982. SFA 30(3)
[La. State Univ. Rice Res. Stn., P.O. Box 1429, Crowley 70527] The effects of supplemental feeding on the winter growth of male bluegill (*Lepomis macrochirus*) x female green sunfish (*L. cyanellus*) F_1 hybrids were investigated in northeast Mississippi. Four 0.04 ha ponds were each stocked at the rate of 2471 fish per ha. Fish in 2 ponds were fed daily while the other fish subsisted only on natural food. After 90 days at water temperatures below 15 C, fed fish were significantly ($P<0.05$) heavier but not longer than non-fed fish. Coefficients of Condition (K) for fed fish showed a significant ($P<0.05$) increase through the winter and were significantly higher than K for non-fed fish, which showed no significant change in K through the winter.

85-003020 Kirk, J. P. COMPETITIVE INFLUENCES OF GIZZARD SHAD INTRODUCTIONS ON BALANCED LARGEMOUTH BASS/BLUEGILL POPULATIONS. *Ph.D. dissertation, Auburn Univ.* 54p. 1984. From Diss. Abstr. Int. B Sci. Eng. 45(12):3677. 1985. SFA 30(3)
Research conducted at Chambers County Public Fishing Lake, Alabama and in large and small pond studies on the Auburn Fisheries Research Unit indicated that gizzard shad caused an imbalance in largemouth bass/bluegill populations. Fish populations in Chambers County Public Fishing Lake were partially poisoned in February 1981 using 0.1 ppm rotenone; the entire gizzard shad population was eliminated with few other species affected. Greater bluegill reproduction occurred throughout the summer months after gizzard shad were eliminated. In the 3 years after shad removal, cove rotenone sampling in the fall indicated that the system had shifted back into balance as defined by Swingle's ratios. Largemouth bass increased in both standing stock and numbers available for harvest the first year after gizzard shad removal, but then declined to approximately 1980 levels by the end of 1982 and 1983; this suggests that in complex systems, species other than gizzard shad may be effective in limiting production of largemouth bass. While some improvement in stock structure was evident, production of largemouth bass was less than what could be expected from an impoundment stocked only with largemouth bass and bluegill. Large and small pond studies conducted on the Auburn University Fisheries Research Unit from 1981 through 1983 demonstrated that gizzard shad could adversely affect bluegill reproduction success within 3 months and could cause an imbalance the first year of their introduction. There was no evidence of a chemical substance secreted by gizzard shad that would inhibit bluegill reproduction. Gizzard shad rapidly grew through the size range where they were vulnerable to

FARM POND AND SMALL IMPOUNDMENT MANAGEMENT AND RESEARCH (CONTINUED)

85-003020 CONTINUED largemouth bass predation; in this three-year study, largemouth bass were neither able to forage efficiently on gizzard shad nor to control their numbers. A proposed model of competition is that gizzard shad populations, even at low levels, consumed by filter-feeding, enough food items to reduce survival of small bluegill. This process accelerated as gizzard shad populations expanded; with less bluegill reproduction available as prey, largemouth bass failed to recruit. Within two years after introduction, gizzard shad comprised half of the standing stock and replaced portions of the carrying capacity in the system normally occupied by largemouth bass and bluegill.

LARGE IMPOUNDMENT MANAGEMENT AND RESEARCH

85-003021 Alexander, C. M. and D. C. Peterson. FEASIBILITY OF A COMMERCIAL PADDLEFISH HARVEST FROM NORRIS RESERVOIR, TENNESSEE. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:202-212. 1982. SFA 30(3)
[TVA, Div. Nat. Resour. Operations, Norris, TN 37828] Mark-recapture techniques were used to estimate the abundance of harvestable size paddlefish (*Polyodon spathula*) in Norris Reservoir, Tennessee, during spring 1980. Results indicated a harvestable population of 8,772 fish with a 95% confidence interval of 4,557 to 18,467. A comparative study using gill nets of various bar mesh sizes showed that gill nets with 17.8-cm bar mesh or larger were more efficient for collecting harvestable paddlefish while having less adverse impact on sport fish species than did nets with smaller mesh sizes. Based on these results, recommendations include allowing commercial harvest on a contract basis of no more than 1,315 paddlefish (15% of the population estimate) or 395 female paddlefish which ever occurs first during the first year harvest, restricting harvest to the month of April, requiring the use of 17.8-cm bar mesh or larger gill nets, assesing the impacts on the fishery at the completion of the first year, and adjusting the harvest quotas for subsequent years if necessary.

85-003022 Barwick, D. H. and J. L. Oliver. FISH DISTRIBUTION AND ABUNDANCE BELOW A SOUTHEASTERN HYDROPOWER DAM. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:135-145. 1982. SFA 30(3)
[U.S. FWS, Great Lakes Fish. Lab., 1451 Green Rd., Ann Arbor, MI 48105] Releases of large volumes of water from low-level release ports during regeneration of peaking hydropower at Hartwell Dam, Georgia-South Carolina, resulted in large daily flow fluctuations and altered water quality in a section of the Savannah River. Flows ranged from minimum of 3 m^3/sec during nongeneration to 665 m^3/sec during generation. Thermal stratification in Hartwell Reservoir generally resulted in low water temperatures (≤20C) throughout the 14-km study area and low dissolved oxygen concentrations (<3mg/1) in the 2-km section of the river immediately below the dam. Distribution of fish species was similar at all sampling locations, but abundance generally increased downstream. Major factors affecting fish abundance below Hartwell Dam appeared to be recruitment of fish from the reservoir, a reduction in habitat diversity just below the dam, water temperatures suitable for sunfish spawning, and stocking of rainbow and brown trout (*Salmo gairdneri* and *S. trutta*).

85-003023 Entz, B. A. G. A SYNTHESIS AND EVALUATION OF ACTIVITIES OF FAO/UNDP PROJECTS ON FIVE AFRICAN MAN-MADE LAKES: KAINJI, KARIBA, KOSSOU, NASSER-NUBIA AND VOLTA. *FAO Fish. Circ.* No. 774. v + 34p. 1984. SFA 30(3)
[Tihany H-8237, Hungary]

85-003024 Filipek, S. P. and M. D. Gibson. AN EXTREME DRAWDOWN ON A HEAVILY POPULATED LAKE: THE PUBLIC RELATIONS ASPECT. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:755-763. 1982. SFA 30(3)
[Ark. Game Fish Comm., Hot Springs 71901]

LARGE IMPOUNDMENT MANAGEMENT AND RESEARCH (CONTINUED)

85-003025 Hall, G. E. RESERVOIR FISHERY RESEARCH NEEDS AND PRIORITIES. *Fisheries (Bull. Am. Fish. Soc.)* 10(2):3-5. 1985. SFA 30(3)

85-003026 Kryzhanovskii, I. V. and I. E. Dyachuk. INFLUENCE OF SELECTIVE HARVEST ON GROWTH AND GENETICS OF BREAM POPULATIONS IN KREMENCHUGSKII RESERVOIR. *Hydrobiol. J. (Eng. Transl. Gidrobiol. Zh.)* 20(6):1-6. 1984. SFA 30(3)
[Inst. Hydrol., AN USSR, Kiev, USSR]

85-003027 Laflin, B. D. FALL WATER-LEVEL FLUCTUATION AND ITS AFFECTS ON THE SPORT FISHERY IN A FLOOD CONTROL RESERVOIR. *Ky. Dep. Fish Wildl. Resour. Bull.* No. 74. 17p. 1985. SFA 30(3)
The affects of various water-level fluctuation rates during the fall drawdown on abundance and harvest of fish in shoreline areas and the overall sportfish harvest were studied in 1974-1981 at Barren River Lake, a 10,000 acre flood control reservoir. Shoreline fish activity increased during either a slow rise or fall in the water level. Black bass occurrence was greatest during a 2-foot decline below summer pool or a 1 to 2-foot rise in water levels during a 15-day period. Sunfish and catfish were more prevalent during stable water levels. Crappie remained relatively unaffected by water level rises, but a rapid decrease from 1 to 2 feet resulted in the number of crappie increasing in the shoreline areas. Maximum fisherman use occurred during slow water-level fluctuations. White bass and crappie harvests were highest during stable water levels. Maximum water levels within a ±2 foot of summer pool were preferred by fishermen. Total harvests of black bass and sunfish were higher when the water level exceeded summer pool at some time during the fall drawdown period. A slow drawdown of 1-2 feet per 15-day period resulted in the greatest occurrence and harvest of sportfish in shoreline areas. Although greatest fisherman use of the shoreline areas occurred during a very slow drawdown, a more rapid drawdown resulted in a higher catch rate.

85-003028 Timmons, T. J. and W. E. Garrett. EFFECTIVENESS OF RESIDUAL STUMPS AS FISH ATTRACTORS IN ALICEVILLE LAKE, ALABAMA-MISSIPPI. *N. Am. J. Fish. Manage.* 5(2B):309-310. 1985. SFA 30(3)
[Biol. Dep., Murray State Univ., Murray, KY 42071]

ESTUARY MANAGEMENT AND RESEARCH

85-003029 Livington, R. J. THE ECOLOGY OF THE APALACHICOLA BAY SYSTEM: AN ESTUARINE PROFILE. *U.S. Fish Wildl. Serv.* FWS/OBS-82/05. xiii+148p. 1984. SFA 30(3)
[Dep. Biol. Sci., Fla. State Univ., Tallahassee 32306]

MARINE MANAGEMENT AND RESEARCH

85-003030 FAO of the UN. SECOND SESSION OF THE IPFC WORKING PARTY ON INLAND FISHERIES. *FAO Fish. Rep.* No. 312. v+56p. 1984. SFA 30(3)
[Rome, Italy]

85-003031 FAO of the UN. FIFTH SESSION OF THE COMMITTEE ON RESOURCE MANAGEMENT. *FAO Fish. Rep.* No. 314. v+42p. 1984. SFA 30(3)
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MARINE MANAGEMENT AND RESEARCH (CONTINUED)

85-003032 FAO of the UN. REPORT OF THE EIGHTH SESSION OF THE GFCM WORKING PARTY ON RESOURCE APPRAISAL AND FISHERY STATISTICS. *FAO Fish. Rep.* No. 315. v+15p. 1984. SFA 30(3)
[Rome, Italy]

85-003033 Guillory, V. and G. Hutton. A SURVEY OF BYCATCH IN THE LOUSIANA GULF MENHADEN FISHERY. *Proc. Annu. Conf. Southeast. Assoc. Fish Wildl. Agencies* 36:213-223. 1982. SFA 30(3)
[La. Dep. Wildl. Fish., P.O. Box 37, Grand Isle 70358]

85-003034 Hightower, J. E. HARVEST POLICIES FOR MULTI-AGED FISH STOCKS. *Ph.D. dissertation, Univ. Ga.* 109p. 1984. From Diss. Abstr. Int. B Sci. Eng. 45(12):3677. 1985. SFA 30(3)

85-003035 Mundy, P. R.; T. J. Quinn II and R. B. Deriso. FISHERIES DYNAMICS - HARVEST MANAGEMENT & SAMPLING. *Wash. Sea Grant Tech. Rep.* WSG 85-1. iii + 60p. 1985. Available at $5.00 from Washington Sea Grant Communications, University of Washington, Seattle, WA 98105.

85-003036 Overholtz, W. J. MANAGING THE MULTISPECIES OTTER TRAWL FISHERIES OF GEORGES BANK WITH CATCH OPTIMIZATION METHODS. *N. Am. J. Fish. Manage.* 5(2B):252-260. 1985. SFA 30(3)
[Northeast Fish. Cent., Natl. Mar. Fish. Serv., Woods Hole, MA 02543]

85-003037 Pshenichnyj, B. P. and N. V. Vershinskij. POSSIBILITIES OF INCREASING MARINE BIOLOGICAL PRODUCTIVITY BY ARTIFICIAL UPWELLING. *Aquaculture* 46(1):77-80. 1985. SFA 30(3)
[VNIRO, Moscow, USSR]

85-003038 Sasaki, T. STUDIES ON THE SABLE FISH RESOURCES OF THE NORTH PACIFIC OCEAN. *Bull. Far Seas Fish. Res. Lab.* 22:1-108. 1985. In English with Japanese summ. SFA 30(3)
[Far Seas Fish. Res. Lab., 7-1, 5-chome Orido, Shimizu 424, Japan]

85-003039 Smith, I. R. and T. Panayotou. TERRITORIAL USE RIGHTS AND ECONOMIC EFFICIENCY: THE CASE OF THE PHILIPPINE FISHING CONCESSIONS. *FAO Fish. Techn. Pap.* 245. vii+17p. 1984. SFA 30(3)
[Int. Cent. Living, Aquatic Resour. Manage., Makati, Metro Manila, Philippines]

85-003040 Volovik, S. P.; G. I. Loots and N. K. Fil'chagin. AN EVALUATION OF NATURAL FISHING MORTALITY OF THE AZOV TYUL'KA, *CLUPEONELLA CULTRIVENTRIS* (CLUPEIDAE). *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 24(5):64-70. 1984. SFA 30(3)
[Mar. Hydrobiol. Inst. Acad. Sci. USSR, Odessa, USSR]

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85-003041 Cheney, D. P. and H. R. Rabanal. REMOTE SENSING AND ITS APPLICATION TO INLAND FISHERIES AND AQUACULTURE. *FAO Fish. Circ.* No. 768. iii + 50p. 1984. SFA 30(3)
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MISC. TECHNIQUES AND EQUIPMENT (CONTINUED)

85-003042 Cosson, M.; R. Billard; J. L. Gatti and R. Christen. RAPID AND QUANTITATIVE ASSESSMENT OF TROUT SPERMATOZOA MOTILITY USING STROBOSCOPY. *Aquaculture* 46(1):71-75. 1985. SFA 30(3)
[Stn. Zool., UR 250, F-06230 Villefranche-sur-Mer, France] An objective technique is proposed for rapid quantitative assessment of spermatozoa motility using stroboscopy. Milt is first prediluted (1:100) in a solution of 40 m*M* KCl, 85 m*M* NaCl, 30 m*M* Tris-HCl, at pH 9.2. One µl of this solution is placed on a slide coated with BSA, diluted with 20 µl of an activation solution (125 m*M* NaCl, 30 m*M* Tris-HCl, pH 9.2), and the beating frequency of the flagella is immediately recorded using a stroboscopic illumination. At 20°C, initial flagellum beating was around 60 Hz and regularly dropped to 15 Hz within 30 s (phase 1). Afterwards, 5-15% of the spermatozoa kept beating for 1 min or more at low frequency, 12.5-7.5 Hz (phase 2). The initial beating frequency was highly dependent on the temperature, and rose from 30 Hz at 5°C to 48Hz at 15°C. The rate of inactivation also depended on the temperature; it increased between 5 and 20°C but seemed to decrease at 25°C.

85-003043 Gunstrom, G. K. and M. Bethers. ELECTRICAL ANESTHESIA FOR HANDLING LARGE SALMONIDS. *Prog. Fish-Cult.* 47(1):67-69. 1985. SFA 30(3)
[Alaska Dep. Fish Game, Island Center Bldg., P.O. Box 20, Douglas 99824]

85-003044 Long, L. V. and E. Hamada. A METHOD OF PROCESSING THE SIGNAL OF AN ECHO SOUNDER IN THE FIELD. *J. Tokyo Univ. Fish.* 70(1-2):1-8. 1983. SFA 30(3)
[Lab. Fish. Ecol., Ocean Res. Inst., Univ. Tokyo, 15-1, 1-chome, Minamidai, Nakano-ku, Tokyo, 164 Japan]

85-003045 Margraf, F. J.; D. M. Chase and K. Strawn. INTAKE SCREENS FOR SAMPLING FISH POPULATIONS: THE SIZE-SELECTIVITY PROBLEM. *N. Am. J. Fish. Manage.* 5(2A):210-213. 1985. SFA 30(3)
[Ohio Coop. Fish. Res. Unit, Dep. Zool., Ohio State Univ., Columbus 43210]

85-003046 Mathur, D.; W. H. Bason; E. J. Purdy, Jr. and C. A. Silver. A CRITIQUE OF THE INSTREAM FLOW INCREMENTAL METHODOLOGY. *Can. J. Fish. Aquatic Sci.* 42(4):825-831. 1985. In English with French summ. SFA 30(3)
[RMC-Muddy Run Ecol. Lab., P.O. Box 10, Drumore, PA 17518]

85-003047 McGurk, M. D. EFFECTS OF NET CAPTURE ON THE POSTPRESERVATION MORPHOMETRY, DRY WEIGHT, AND CONDITION FACTOR OF PACIFIC HERRING LARVAE. *Trans. Am. Fish. Soc.* 114(3):348-355. 1985. SFA 30(3)
[Inst. Anim. Resour. Ecol., Univ. British Columbia, 2204 Main Mall, Vancouver, BC V6T 1W5, Canada]

85-003048 Schleiger, S. L. and E. J. Peters. DESIGN AND IMPLEMENTATION OF LOW-FLOW FISH BARRIERS FOR USE IN SMALL STREAMS. *Proc. Nebr. Acad. Sci. Affil. Soc.* 95:30. 1985. Abstract only. SFA 30(3)
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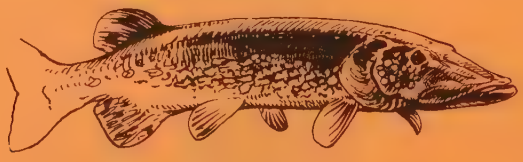

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